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January 1989

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RECLAMATION AND DEVELOPMENT GRANTS PROGRAM

Project Evaluations and Recommendations
for 1990-1991 Biennium

and

Status Report for
Previously Funded Projects

January 1989

Montana Department of Natural
Resources and Conservation

ABBREVIATIONS

ARCO - Atlantic Richfield Company

BLM - Bureau of Land Management

BMP - best management practices

BOGC - Board of Oil and Gas Conservation

CD - conservation district

CDD - Conservation Districts Division

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

cfs - cubic feet per second

CO_2 - carbon dioxide

DFWP - Department of Fish, Wildlife and Parks

DHES - Department of Health and Environmental Sciences

DNRC - Department of Natural Resources and Conservation

DOA - Department of Agriculture

EIS - Environmental Impact Statement

EPA - Environmental Protection Agency

FY - fiscal year

GIS - Geographic Information System

gpm - gallons per minute

HCN - hydrogen cyanide

IJC - International Joint Commission

km - kilometer

MBMG - Montana Bureau of Mines and Geology

mg/l - milligrams per liter

MRI - Montana Resources, Inc.

MSCA - Montana Salinity Control Association

MSU - Montana State University

NCAT - National Center for Appropriate Technology

NHP - Natural Heritage Program

NPS - nonpoint source

NRIS - Natural Resource Information System

pH - measure of acidity or alkalinity of a solution

ppm - parts per million

RC&D - Resource Conservation and Development

RDGP - Reclamation and Development Grants Program

REDEQL - an equilibrium speciation computer program

RIT - Resource Indemnity Trust

RTI - Renewable Technology, Inc.

SCS - Soil Conservation Service

TDS - total dissolved solids

TM - Thematic Mapper

URA - Urban Revitalization Agency

USFS - U.S. Forest Service

USFWS - U.S. Fish and Wildlife Service

USGS - U.S. Geological Survey

WDP - Water Development Program

WQB - Water Quality Bureau

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CHAPTER I

INTRODUCTION

During the 1985 Montana legislative session, the governor proposed that the legislature create a Legacy Program to compensate the people of Montana for damages caused by resource extraction (SB 277). The program was to do this by investing interest income from the resource indemnity trust (RIT) tax on extracted minerals for a variety of projects that would benefit the public. The Legacy Program specified a number of purposes, including mine reclamation, mitigation for mineral extraction, natural resource development, conservation, and research on mineral development impacts.

At the request of other parties, a similar bill (HB 913) was also introduced. Entitled the Montana Mineral Legacy Act, it proposed to fund four major natural resource programs intended to promote mineral reclamation and research projects, the development of water, the development of renewable resources, and hazardous waste management.

Neither bill was passed. Nevertheless, the 1985 legislature did act on proposed projects for reclamation and renewable resource development that had been reviewed and prioritized by the Department of Natural Resources and Conservation (DNRC). These projects would have been funded under the Legacy Program had the enabling legislation passed. Rather than either of the aforementioned bills, the legislature chose to enact HB 922, an appropriations bill, which authorized $4,198,476 for 22 projects. HB 922 also established the Environmental Contingency Account to be used for emergencies and to be controlled by the Office of the Governor.

In June 1986, the special session of the Montana Legislature directed the Montana Department of Natural Resources and Conservation to solicit, evaluate, and rank a second round of RIT grant applications. At the same time, the Governor's Office worked with several interests in developing proposed new RIT enabling legislation. This legislation (SB 373), introduced at the request of the governor, incorporated aspects of both SB 277 and HB 913, which had been introduced in 1985.

SB 373 was passed by the 1987 Montana Legislature and is titled The Reclamation and Development Grants Program Act (90-2-1101, MCA). An accompanying appropriations bill (HB 6) was also passed authorizing $3,370,961 for 27 projects. Administrative rules pursuant to the act were adopted by the Board of Natural Resources and Conservation on March 21, 1988.

The Reclamation and Development Grants Program Act requires that the governor submit, by the first day of each regular session of the legislature, a list of all grant proposals received with his recommended priorities for funding. Administrative rules further provide that DNRC must furnish to the legislature a status report on all previously funded projects. This report is the result of those directives.

CHAPTER II

RDGP DESCRIPTION AND PROCEDURES

Program Information

The Reclamation and Development Grants Program (RDGP) is a state-funded grants program designed to fund projects that "indemnify Montana citizens for the effects of mineral development on public resources and that meet other crucial state needs serving the public interest and the total environment of the people of Montana" (90-2-1102, MCA). The program, established by the 1987 Montana Legislature, is administered by the Montana Department of Natural Resources and Conservation.

In February 1988, an extensive promotional effort was launched that targeted all Montana communities, counties, the university system, conservation districts, state agencies, state legislators, and others who might benefit by program participation. This effort included mailings of application materials and holding 14 application instruction workshops throughout the state. The application deadline was May 15, 1988. The DNRC received 35 applications for RDGP funding totaling $6,321,149.

The funding source for this program is the interest income from the Resource Indemnity Trust Fund (RITF). This fund, established by Section 15-38-201, MCA, receives proceeds from taxes levied on mineral production. The 1987 legislature directed that, beginning in state fiscal year 1990, 46 percent of the interest income from the RITF must be allocated to the Reclamation and Development Grants Program (approximately $6.4 million/biennium). During previous state fiscal years 1986 through 1989, 49 projects totaling more than $7.5 million have been funded.

Project Eligibility

The following excerpts from the Reclamation and Development Grants Program Act establish criteria that projects must meet in order to be eligible for funding.

(1) Except as provided under subsection (2), to be eligible for funding under the Reclamation and Development Grants Program, the proposed project must provide benefits in one or more of the following categories:

(a) reclamation of land, water, or other resources adversely affected by mineral

development;

(b) mitigation of damage to public resources caused by mineral development;

(c) research, demonstration, or technical assistance to promote the wise use of Montana minerals, including efforts to make processing more environmentally compatible;

(d) investigation and remediation of sites where hazardous wastes or regulated substances threaten public health or the environment; and

(e) research to assess existing or potential environmental damage resulting from mineral development.

(2) If sufficient eligible and qualified applications satisfying the mineral development objectives provided for in subsection (1) are not received, or if there is a crucial state need, DNRC may evaluate and the governor may recommend that the legislature approve funding for projects that:

(a) enhance Montana's economy through the development of natural resources; or

(b) develop, promote, protect, or further Montana's total environmental and public interest, including the general health, safety, welfare, and public resources of Montana citizens and communities.

Applicant Eligibility

Any department, agency, board, commission, or other division of state government or any city, county, or other political subdivision or tribal government within the state may apply for a grant from the Reclamation and Development Grants Program.

Funding Limits

No grant may exceed $300,000. An applicant proposing more than one project may submit a separate application for each. There is no minimum funding limit.

Application Review And Ranking Procedures

The grant applications were evaluated for the proposed projects' technical and financial feasibility, public benefits to be provided, need and urgency, and impacts on the environment. Reviewers included staff members of the department's Water Development, Facility Siting, and Water Management Bureaus, with assistance from federal, state, and university personnel having expertise in specific project areas. For each application, a

descriptive project summary was written incorporating the concerns, ideas, and comments of the project reviewers; those summaries appear in Chapter IV and Chapter V of this report.

Because more funds are requested than are available, the department ranks feasible projects so that it can recommend funding priority and funding level to the legislature. Evaluation criteria established by the 1987 legislature include, but are not limited to:

(1) the degree to which the project will provide benefits in its eligibility category or categories;
(2) the degree to which the project will provide public benefits;
(3) the degree to which the project will promote, enhance, or advance the policies and purposes of the Reclamation and Development Grants Program;
(4) the degree to which the project will provide for the conservation of natural resources;
(5) the degree of need and urgency for the project;
(6) the extent to which the project sponsor or local entity is contributing to the costs of the project or is generating additional non-state funds;
(7) the degree to which jobs are created for persons who need job training, receive public assistance, or are chronically unemployed; and
(8) any other criteria DNRC considers necessary to carry out the policies and purposes of the Reclamation and Development Grants Program.

Under the ranking system, a proposal could receive a maximum of 215 points. Specific criteria were established for each category to provide consistency. Of the following criteria, public benefits and need and urgency were weighted most heavily.

		Maximum Points Possible
1.	Public Benefits	90
2.	Need and Urgency	50
3.	Appropriateness of Technical Design	40
4.	Financial Feasibility	15
5.	Overall Project Quality	20
	Total Possible Points:	215

Recommendations

After ranking the projects and recommending funding, the Water Resources Division made its recommendations to the DNRC director. The director then presented DNRC's recommendations to the governor. An appropriations bill listing the governor's recommendations will be introduced to the 1989 legislature. By appropriation or other appropriate means, the legislature may approve grants for those projects it finds consistent with the policies and purposes of the RDGP.

CHAPTER III
RANKING OF AND FUNDING RECOMMENDATIONS FOR PROJECTS PROPOSED TO THE 1989 LEGISLATURE

RANKING OF AND FUNDING RECOMMENDATIONS

	NAME OF APPLICANT	PROJECT NAME	PUBLIC BENEFITS	NEED AND URGENCY	TECHNICAL DESIGN	FINANCIAL FEASIBILITY	PROJECT QUALITY	TOTAL	RECOMMENDED FUNDING	ACCUMULATIVE TOTAL
1	LEWIS AND CLARK COUNTY CONSERVATION DISTRICT	BLACKFOOT RIVER ABANDONED MINES	69	50	34	10	15	178	$300,000	$300,000
2	STATE LANDS, DEPARTMENT OF	ELKHORN CREEK WATER QUALITY IMPROVEMENT PROJECT	67	44	35	8	14	168	$300,000	$600,000
3	STATE LANDS, DEPARTMENT OF	WOOD CHUTE CREEK BASIN WATER QUALITY IMPROVEMENTS	63	42	32	11	13	161	$300,000	$900,000
4	MONTANA STATE UNIVERSITY RECLAMATION RESEARCH UNIT	THE FATE OF CYANIDE IN SOILS AND HEAP-LEACH PADS	61	48	28	6	14	157	$140,243	$1,040,243
5	MONTANA BUREAU OF MINES AND GEOLOGY	LAND APPLICATION OF CYANIDE LEACH SOLUTIONS	60	46	31	7	13	157	$91,161	$1,131,404
6	STATE LANDS, DEPARTMENT OF	MIDDLE FORK WARM SPRINGS CREEK RECLAMATION PROJECT	63	38	31	11	13	156	$300,000	$1,431,404
7	BUTTE-SILVER BOW, GOVERNMENT OF	PUBLIC LANDS RECLAMATION PROJECT	62	42	32	6	12	154	$120,800	$1,552,204
8	NATURAL RESOURCES AND CONSERVATION, DEPARTMENT OF, CONSERVATION DISTRICTS DIVISION	NONPOINT SOURCE POLLUTION CONTROL IN MONTANA	60	43	25	12	13	153	$262,573	$1,814,777
9	TOOLE COUNTY	NORTH TOOLE COUNTY RECLAMATION PROJECT	60	37	29	10	14	150	$299,040	$2,113,817
10	MONTANA STATE LIBRARY	MONTANA NATURAL HERITAGE PROGRAM	55	40	29	9	14	147	$197,607	$2,311,424
11	BUTTE-SILVER BOW, GOVERNMENT OF	OPHIR MINE RECLAMATION PROJECT	51	42	30	9	11	143	$185,027	$2,496,451
12	MONTANA BUREAU OF MINES AND GEOLOGY	THE USE OF NATURAL ZEOLITES IN REDUCING HEAVY METAL CONCENTRATIONS AT MINING OPERATIONS AND IMPACTED LANDS	48	41	28	9	13	139	$149,238	$2,645,689
13	MONTANA BOARD OF OIL AND GAS CONSERVATION	BROADVIEW WELL	48	35	36	8	10	137	$65,600	$2,711,289
14	MONTANA SALINITY CONTROL ASSOCIATION	SALINITY CONTROL: A NONPOINT SOURCE POLLUTION MANAGEMENT PROGRAM	46	35	33	9	14	137	$300,000	$3,011,289
15	MONTANA STATE UNIVERSITY RECLAMATION RESEARCH UNIT	TOXIC AND RESIDUAL CYANIDE EFFECTS ON SOIL MICROORGANISMS, INVERTEBRATES, AND PLANTS AT HEAP-LEACH MINE SITES	51	40	26	6	12	135	$104,391	$3,115,680
16	MONTANA STATE UNIVERSITY WATER RESOURCES CENTER	MINE WATER TREATMENT/METALS RECOVERY PROCESS	45	37	28	9	12	131	$98,860	$3,214,540
17	KALISPELL, CITY OF	LAWRENCE PARK SLOPE STABILIZATION AND RECLAMATION	44	28	29	11	12	124	$170,260	$3,384,800
18	BUTTE-SILVER BOW, GOVERNMENT OF	MINE SUBSIDENCE RECLAMATION PROJECT	42	30	30	10	10	122	$170,000	$3,554,800
19	MONTANA STATE UNIVERSITY PLANT AND SOILS SCIENCE DEPARTMENT	PREDICTING MOVEMENT OF PESTICIDES THROUGH MONTANA SOILS TO GROUNDWATER: AN ON-FARM MANAGEMENT TOOL	41	30	22	10	9	112	$82,990	$3,637,790
20	BUTTE-SILVER BOW, GOVERNMENT OF	MITIGATION OF MINING AND SMELTING DAMAGE THROUGH URBAN FORESTRY	37	28	27	8	9	109	$200,000	$3,837,790
21	DEER LODGE VALLEY/MILE HIGH CONSERVATION DISTRICTS	RESTORATION OF AGRICULTURAL PRODUCTIVITY IN LANDS AFFECTED BY MINE WASTE POLLUTION IN THE CLARK FORK BASIN	31	31	19	10	12	103	$189,401	$4,027,191
22	UPPER MUSSELSHELL CONSERVATION DISTRICT	MUSSELSHELL RIVER STREAM CORRIDOR PROJECT	50	38	25	8	11	132	$126,145	$4,153,336
23	WHITEFISH COUNTY WATER AND SEWER DISTRICT	SWIFT CREEK CLAY BANKS - PILOT PROJECT	51	35	22	8	11	127	$73,955	$4,227,291
24	NATURAL RESOURCES AND CONSERVATION, DEPARTMENT OF CONSERVATION DISTRICTS DIVISION	AN ACCELERATED SOIL SURVEY PROGRAM FOR MONTANA	48	30	31	9	9	127	$264,418	$4,491,709
25	MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY	COMPUTER MODEL FOR AND THE EXPERIMENTAL APPLICATION OF THE TREATMENT OF BERKELEY PIT ACID WATER	28	22	25	12	10	97	$24,963	$4,516,672
26	UNIVERSITY OF MONTANA, SCHOOL OF FORESTRY	MAPPING SALINE SEEP WITH LANDSAT THEMATIC MAPPER DATA	24	27	20	9	6	86	$18,983	$4,535,655
27	BUTTE-SILVER BOW, GOVERNMENT OF	BUFFALO AND MISSOULA GULCH MINE RECLAMATION EROSION CONTROL	24	18	16	3	7	68	$300,000	$4,835,655
28	BUTTE-SILVER BOW, GOVERNMENT OF	DEVELOPMENT OF A MINE SUBSIDENCE INSURANCE PROGRAM	0	0	0	0	0	0	NONE	$0
29	HEALTH AND ENVIRONMENTAL SCIENCES, DEPARTMENT OF	PESTICIDE CONTAMINATION CLEAN-UP IN MONTANA	0	0	0	0	0	0	NONE	$0
30	HEALTH AND ENVIRONMENTAL SCIENCES, DEPARTMENT OF	RESPONSIBLE PARTY CLEAN-UP OF SELECTED HAZARDOUS WASTE SITES IN MONTANA	0	0	0	0	0	0	NONE	$0
31	MONTANA BUREAU OF MINES AND GEOLOGY	COAL LANDS GROUNDWATER MONITORING	0	0	0	0	0	0	NONE	$0
32	MONTANA BUREAU OF MINES AND GEOLOGY	EFFECT OF INITIAL MOISTURE CONDITIONS ON MOVEMENT AND RESIDUAL SATURATION OF HYDROCARBONS IN MONTANA SOILS	0	0	0	0	0	0	NONE	$0
33	RED LODGE, CITY OF	WEST BENCH SLOPE STABILIZATION	0	0	0	0	0	0	NONE	$0
34	STATE LANDS, DEPARTMENT OF	EMERGENCY NON-COAL MINE RECLAMATION PROGRAM	0	0	0	0	0	0	NONE	$0
35	STATE LANDS, DEPARTMENT OF	GALENA CREEK MILL TAILINGS RECLAMATION PROJECT	0	0	0	0	0	0	NONE	$0

CHAPTER IV

SUMMARIES OF PROJECTS RECOMMENDED FOR FUNDING

Summaries of all projects recommended for RDGP funding, along with the amounts recommended, are presented in this chapter. The summaries appear in the order in which the projects are ranked.

- 1-

APPLICANT NAME: Lewis and Clark County Conservation District

PROJECT/ACTIVITY NAME: Blackfoot River Abandoned Mines

AMOUNT REQUESTED: $233,400

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $233,400

PROJECT DESCRIPTION:

The Blackfoot River Abandoned Mines Project is composed of three sites: (1) the Blackfoot tailings (located approximately 4 miles west of Lincoln, Montana); (2) the Edith and Mary P mines (located in the headwaters of the Blackfoot River approximately 15 miles east of Lincoln); and (3) the Anaconda mine (located approximately 1 mile southeast of the Edith and Mary P mines). These sites consist of dilapidated structures, mill tailings ponds, collapsed adits and shafts, and assorted mining debris. The sites continue to be a safety and health hazard to those who directly use these areas and to those utilizing downstream areas. A significant problem is the constant erosion and leaching of the tailings material, polluting downstream waters.

Reclamation proposed at these sites will include removing tailings from drainage ways and disposing of them in appropriate areas; sealing all mine openings; disposing of all structures, debris, and trash; and liming, topsoiling, and revegetating all disturbed areas.

TECHNICAL ASSESSMENT:

The proposed project represents a logical and necessary approach to improve the vegetative, soil, and water resources of the upper Blackfoot River drainage. It will enhance reclamation work and water quality studies currently under way by several agencies and private groups, including a project for which the Department of State Lands (DSL) received a RDGP grant in 1987. The DSL project, which was ranked first by the legislature, addresses reclamation and water quality improvement immediately above and below the proposed project. However, due primarily to program funding limits, the middle section of the project was left unaddressed. Reclamation at each of the project sites is

well documented by appropriate data and engineering design. The measures proposed represent state-of-the-art technology and will be carried out by qualified, competent reclamation contractors.

One constraint to funding the project, as proposed, is the possible inclusion of the Blackfoot tailings site into a mining company's permit area. If this eventuates, it will be necessary to delete this site from the proposal. Irrespective of this constraint, it is increasingly likely that the above referenced DSL project will fall short of funds needed for completion. The preferred and most cost-effective alternative for the area is to complete reclamation work in the upper drainage. Therefore, the Blackfoot tailings should be excluded from this proposal and replaced with selected portions of the DSL Mike Horse Mine site.

Site monitoring before and after reclamation is proposed to measure the improvements to both water quality and vegetation. The water quality component should be coordinated with the sediment/heavy metals study and the fisheries study currently being conducted by the University of Montana and the Department of Fish, Wildlife and Parks, respectively.

Overall, the proposal is a highly appropriate use of RDGP funds in that it will significantly aid in repairing, reclaiming, and mitigating the environmental damage caused by mineral development activity.

FINANCIAL ASSESSMENT:

The applicant is requesting grant funds for the entire amount of the reclamation project. All services required for this project will be awarded to qualified contractors. Engineering, permitting, administration, and construction inspection will be contracted to a consulting engineering firm experienced in mine reclamation. Construction will also be a contracted service that will be awarded to a qualified contractor through competitive bidding.

The Blackfoot River Abandoned Mines Project, with recommended changes, is estimated to cost $300,000. Costs for engineering and administration are expected to total 5-15 percent of construction costs. Material and work requirements were determined using appropriate and standard engineering practices. Cost estimates are reasonable for the work proposed.

ENVIRONMENTAL ASSESSMENT:

Improvements to water quality, vegetation, and wildlife are expected to result from this project. Long-term adverse impacts are not foreseen. Short-term impacts occurring during construction will be minimized by careful design.

PUBLIC BENEFITS ASSESSMENT:

The benefits of this reclamation project will be significant. The adverse impacts of past mining operations will be partially eliminated. The continued impact on the Blackfoot River and its tributaries will be lessened, preserving the natural resources essential to ranchers, irrigators, and domestic users as well as wildlife, fish, and aquatic life in the immediate area and downstream reaches.

The health and safety of the public will be served, sources of water pollution eliminated, and physical hazards at the sites removed. All Montanans will benefit in that Montana's environment will be enhanced and the adverse effects of unregulated mining removed.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. The final project design must address acid water discharge at the Mike Horse Mine.
3. The Blackfoot tailings site is excluded from this recommendation.

APPLICANT NAME: State Lands, Department of

PROJECT/ACTIVITY NAME: Elkhorn Creek Water Quality Improvement Project

AMOUNT REQUESTED: $211,200

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $211,200

PROJECT DESCRIPTION:

The Elkhorn Mine is located in the uppermost drainage of the Wise River near Wise River, Montana. The project site contains a mine adit, a mine tailings dump area, and a mill tailings area. The mill tailings area is located in and adjacent to Elkhorn Creek and is being eroded by creek flows. The eroded tailings material is transported and redeposited in Elkhorn Creek several miles downstream. Flows from the mine adit and surface water from rainfall and snowmelt seep through the tailings, leaching heavy metals into Elkhorn Creek. The leachate has degraded the water quality in Elkhorn Creek below the mine site, resulting in an absence of fish and other aquatic bottom life.

The proposed reclamation plan will remove the mill tailings pile from the Elkhorn Creek floodplain, thus eliminating a source of erosion and pollution. Discharge from the mine adit will be "piped around" the tailings to prevent seepage through the tailings. The mine tailings pile will be sloped and graded to provide positive drainage from the location. The mill tailings site, the mine tailings pile, and the mine entrance area will be recontoured, topsoiled, and revegetated.

Reclamation at the project site will improve water quality in Elkhorn Creek, re-establish the aquatic environment, eliminate safety hazards, and improve the aesthetics of the area.

TECHNICAL ASSESSMENT:

Objectives of the project can be summarized as follows:

1. Improve water quality by eliminating erosion of tailings material into Elkhorn Creek
2. Improve water quality by eliminating or reducing acid mine drainage through tailings material
3. Increase fish and wildlife habitat and improve area aesthetics by removing tailings material from the creek and revegetating the area
4. Minimize the disturbance of currently undisturbed areas
5. Eliminate any safety hazards

The objectives will be accomplished by implementation of nine separate construction tasks incorporating state-of-the-art reclamation techniques and technology. Pre- and post-monitoring is planned to measure water quality and vegetation improvement. Ironically, improvements to water quality may threaten a pure strain of westslope cutthroat trout residing in the waters above the mine site. At present, the pollution from the mine acts as a chemical barrier to invasion by downstream brook trout and other species. Final design plans and specifications should address this impact. Additionally, treatment (wetlands/settling ponds) of the adit acid water discharge (to accomplish objective 2) must be included in final project design.

Overall, the project is a highly appropriate use of RDGP funds in that it will aid in repairing, reclaiming, and mitigating adverse impacts caused by mineral development.

FINANCIAL ASSESSMENT:

The Department of State Lands is requesting grant funds for the entire amount of the reclamation project. All services required for this project will be awarded to qualified contractors. Engineering, permitting, administration, and construction inspection will be contracted to a consulting engineering firm experienced in mine reclamation. Construction will also be a contracted service that will be awarded to a qualified contractor through competitive bidding.

The Elkhorn Creek Water Quality Improvement Project is estimated to cost $211,200 (which includes 10 percent construction contingency). Construction cost is estimated to be $167,000 for the work scope as outlined in the application. Inclusion of a wetlands/settling pond into the final design will increase the cost of reclamation construction by approximately $91,000. This is a necessary and reasonable cost.

ENVIRONMENTAL ASSESSMENT:

Removal of the tailings material from Elkhorn Creek, treatment of adit discharge, and reclamation/revegetation of disturbed areas will have a positive effect on the environment. Long-term adverse impact on the environment is not foreseen. Short-term impact (sedimentation) on the stream will occur during

construction but should be minor if work is properly scheduled and implemented.

PUBLIC BENEFITS ASSESSMENT:

Reclamation activities at the project site will benefit downstream agricultural and domestic water users through improved water quality. Wildlife and fisheries will benefit from the project by the creation of more habitat through revegetation and water quality improvement. The public will benefit from increased recreational areas and opportunities because of the regraded/revegetated lands that will, in turn, create additional wildlife habitat. Finally, private individuals or public agencies proposing to reclaim areas with similar disturbances can use the results of reclamation techniques employed at this project site. Some short-term adverse impacts such as dust emissions, noise, and increase in traffic may occur during the reclamation process, but long-term environmental impacts from the reclamation will be very positive in the form of improved water and land quality.

If the area is not reclaimed, water quality degradation, soil and tailings erosion, and loss of fish and wildlife habitat will continue. In essence, the water quality of the Big Hole River is at risk. Water users downstream will be subject to waters that have been contaminated by the past mining activities.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. Provisions for treatment of the adit discharge must be included in the final design.
3. The advisability of placing the mill tailings on the mine tailings must be investigated further.

- 3 -

APPLICANT NAME: State Lands, Department of (DSL)

PROJECT/ACTIVITY NAME: Wood Chute Creek Basin Water Quality Improvements

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: DSL - $59,900 (Abandoned Mine Reclamation Program)

TOTAL PROJECT COST: $359,900

PROJECT DESCRIPTION:

Three specific mine sites are proposed for reclamation:

Washington, Minah, and Bluebird Mines located in Jefferson County approximately seven miles southwest of Jefferson City. These sites are located in natural drainages where surface runoff and spring-fed streams continually flow over and through tailings piles located in the original stream channels. Contact between the water and the tailings creates continuous erosion and leaching, resulting in downstream deposition of the tailings along with introduction of heavy metals and other pollutants to the receiving streams. There are also numerous safety hazards associated with each of the sites. Open adits and an open shaft pose a serious threat to persons, livestock, and wildlife. Deteriorated mine structures and loose, steep slopes on tailings piles are other safety hazards. The tailings are void of all vegetation and contrast negatively with the natural surroundings.

Reclamation will include disposing of mine structures, closing mine openings, recontouring the tailings, isolating the tailings from surface runoff, and revegetating the disturbed areas.

TECHNICAL ASSESSMENT:

Washington Mine Site

The Washington Mine is divided into two sites: Upper Mine Dump and Lower Mill Dump. The Upper Mine Dump and Lower Mill Dump are each located in the same narrow, steep drainage that also includes a small perennial stream. The mine site is approximately 25 acres in size. The tailings in each dump span the entire width of the drainage for a combined length of 1,300 feet, are void of vegetation, and were deposited in a way to create small ponds. Water from perennial stream flowing at an estimated 1 cfs and two adits discharging 50-75 gpm flows over and through the tailings. Measurements show that significant infiltration reduces these flows by over 50 percent within a one-mile stretch downstream of the Washington Mine. The combination of runoff and infiltration erodes the dumps and has resulted in the transportation and deposition of tailings downstream. Depressions in the dumps collect surface water and snowmelt that infiltrate the dumps. This water percolates through the dump and eventually emerges at the base. This dump leachate is high in heavy metals and other toxic substances and is the source of pollutants to this unnamed tributary to Wood Chute Creek. The pollutants degrade the downstream aquatic environment. Limited water quality data are available to document the dump discharge impacts; however, the dumps are a major source of pollution. Natural, unpolluted flows originating from upstream springs flow over and through the dump tailings en route to receiving streams. The water emerging from the dump is of poor quality with a reddish appearance downstream from the dumps.

Other problems associated with the Washington Mine include an open adit, deteriorated buildings and mine structures, and unstable steep slopes on the tailings dumps. These problems are serious safety hazards to livestock, wildlife, and persons that

go onto the site.

Minah Mine Site

The Minah Mine is located approximately one-quarter mile north of the Washington Mine dumps. This site consists of a tailings dump, a timber load-out structure, and a collapsed adit discharging approximately 30 gpm of acidic, iron-bearing water. Mine discharge flows across the surface of the tailings dump, cascades down the face of the dump, and continues down the drainage toward an unnamed tributary to Wood Chute Creek. This causes continual erosion of the tailings and subsequent deposition in downstream areas. Water quality data are limited for the Minah Mine discharge, but visible evidence shows that the discharge periodically percolates through the dump and emerges at its base as a leachate high in heavy metals. These conditions are obviously diminishing the water quality in the affected area.

A previous study concluded that the recharge area required to yield a 30 gpm discharge from the adit is relatively small and is most likely the 40- to 50-acre area above the mine. The hilltop above the discharging adit is sparsely vegetated and has numerous exploration pits and trenches that trap water that infiltrates the mine. It is probable that backfilling and grading the exploration pits and trenches will limit infiltration and reduce the acidic discharge.

Bluebird Mine

The Bluebird Mine is located approximately 1.5 miles west of the Washington Mine site. Two dumps comprising this site are located in a narrow, steep drainage that discharges into Wood Chute Creek. The site is approximately six acres in size. The tailings dumps span the entire width of the drainage for a combined length of approximately 750 feet. The dumps are void of vegetation and are contoured to form scattered ponding areas that promote infiltration into the tailings. A small stream, which appears to be perennial, flows over and through the tailings and combines with discharges from both adits totaling about 20-25 gpm. The adit discharges also flow over and through the tailings. These surface flows are continually eroding the barren dumps and depositing the tailings downstream from the site, thus expanding the area impacted by past mining operations. The ponds and flat surfaces of the dumps also allow infiltration of water through the tailings, resulting in a leachate high in heavy metals emanating from the base of the dumps. Water quality data for the Bluebird Mine are limited, but water flowing over and through the mine tailings reduces the water quality. Water quality degradation is a predicted consequence of mine dump discharge and is typical of many related mine sites in western Montana.

Other adverse environmental impacts at the Bluebird Mine site include open adits, a shaft, deteriorated buildings and mine structures, and unstable steep slopes on the dumps. These conditions pose safety hazards to livestock, wildlife, and persons that go onto the site.

Overall, the state-of-the-art methods proposed to reclaim

the three sites are similar and represent an appropriate use of RDGP funds. In order of importance to improving the environment, the Washington mine site ranks highest, followed by the Bluebird and Minah. This project will significantly complement other reclamation work being conducted in the Prickly Pear Creek drainage.

FINANCIAL ASSESSMENT:

The Department of State Lands is requesting grant funds only for the construction portion of the reclamation project ($282,000 plus contingency). Construction will be a contracted service that will be awarded to a qualified contractor through competitive bidding. All other services, including those listed under Engineering/Administration and travel expenses, will be funded by the federal Abandoned Mine Reclamation Program, which is administered by the Department of State Lands, Abandoned Mine Reclamation Bureau. Engineering, permitting, administration, and construction inspection will be contracted to a consulting engineering firm experienced in mine reclamation design. The DSL will provide in-kind contributions through its own staff and facilities for categories such as: salary and wages for any additional administrative and supervisory costs, supplies and materials such as office supplies, rent and utilities by providing existing office space, and any miscellaneous costs related to administration of the project. The costs are similar to those at other DSL reclamation projects and are reasonable for the scope of work proposed.

ENVIRONMENTAL ASSESSMENT:

The area's natural resources will be preserved and improved as a result of this project. The improvements to water quality, vegetation, and wildlife are considerable. No long-term adverse impacts are anticipated. Short-term impacts during construction can be minimized by careful design and planning.

PUBLIC BENEFITS ASSESSMENT:

Benefits resulting from this reclamation project will be numerous. Sources of water pollution that now affect the receiving streams (including Wood Chute Creek, Spring Creek, Prickly Pear Creek, and the Missouri River) will be isolated and eliminated. This will improve the aquatic environment for fish as well as wildlife that rely on these streams. It will also improve the quality of these water sources that are used by farmers, ranchers, irrigators, and domestic users. Many recreationists, including hunters, snowmobilers, hikers, and naturalists, use this area throughout the year. These people will benefit in that the safety and health impacts of the sites will be eliminated and the aesthetic eyesores removed. Montana as a whole will benefit when an area seriously impacted from past mining operations can be reclaimed and returned to a natural setting.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended contingent upon DNRC approval of the project scope of work and budget.

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APPLICANT NAME: Montana State University, Reclamation Research Unit

PROJECT/ACTIVITY NAME: The Fate of Cyanide in Soils and Heap-leach Pads

AMOUNT REQUESTED: $168,687

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $168,687

PROJECT DESCRIPTION:

The Reclamation Research Unit proposes to study the fate of cyanide that is used in the heap-leach mining process. In this process, precious metals are recovered by percolating a cyanide solution through a pile of crushed ore. Phase I of the study would be conducted at MSU facilities with chemical analyses by a Billings laboratory. Phase II would be conducted at a typical, but as yet unselected, heap-leach site. The heap-leach process is currently used at several mines in Montana. Increases in the market prices of precious metals would increase the level of mining and associated heap leaching. Releases of cyanide from heap leaching have been recorded, and there is a potential for more releases. Cyanide solution may accidentally enter the environment through overflow or failure of process ponds. It also is treated and intentionally sprinkled in selected areas.

In Montana, alkaline chlorination is the preferred method of treatment. The reduced cyanide is less toxic; however, excess chlorine can inhibit microbial degradation of remaining cyanide. The cyanide solution also contains metals that are potentially toxic.

Relatively little information is available regarding the fate of cyanide in released-process solutions. Similarly, little is known about the fate of cyanide in reclaimed heap-leach pads. Degradation of cyanide by soil microbes is not always reliable; the microbe's effectiveness is influenced by several variables (such as soil pH and texture, aerobic conditions, and the presence of various reactive metals). Cyanide associated with heap leaching has the potential to reduce the utility of reclaimed leach pads and to enter nearby water supplies.

The objective of Phase I of this study is to evaluate the fate and transport of cyanide and cyanide-metal complexes in three typical soils. The rate of degradation, changes in types, and mobility of cyanide will be assessed. Both untreated and treated cyanide solutions will be added to the soils. The

objective of Phase II is to evaluate the fate and transport of cyanide and cyanide-metal complexes in heap-leach pads. The same cyanide characteristics noted in Phase I will be identified. In Phase I, three typical Montana soils will be selected and placed in replicated columns. Metal-enriched cyanide solutions will be added to the columns. Carbon dioxide (CO_2) evaluation, hydrogen cyanide (HCN) volatilization, and cyanide in the leachate will indicate the loss of cyanide. At the experiment's close, cyanide species at various depths in the columns will be analyzed to determine cyanide mobility.

In Phase II, samples from an existing heap-leach pad will be analyzed. Sampling will require the use of an untested system of horizontal lysimeters. (Usual lysimeter methodology would not yield usable samples due to mixing and aeration). Samples will be collected over 18 months and analyzed in the lab for various cyanide compounds. Wells at the heap-leach site will be monitored for the presence of cyanide in the groundwater. Project products include progress reports and a final bulletin.

TECHNICAL ASSESSMENT:

Since so little is known about the fate of cyanide used in heap leaching, experimental results could greatly increase available information. Reviewers generally supported the proposed study. Some were concerned that the results may not always be directly applicable to field situations. Other concerns dealt with the selection of field sites and groundwater sampling. Despite these concerns, reviewers agreed that reasonable methodologies are being employed to investigate an important problem.

The project addresses a major objective of the RDGP in that it assesses existing or potential environmental damage resulting from mineral development.

FINANCIAL ASSESSMENT:

The budget fails to include funding for groundwater monitoring and measuring HCN volatilization and CO_2 evaluation. The heap-leach pads would have 20 sampling points; yet, the budget addresses only 16 samples per trip. The remaining budget is adequate and reasonable; however, the travel budget should not be finalized until field sites are selected.

ENVIRONMENTAL ASSESSMENT:

Neither phase of the study would affect the environment.

PUBLIC BENEFITS ASSESSMENT:

Due to the dearth of information on the fate of cyanide, the study would certainly improve understanding of the subject. Mining companies and regulatory agencies would be the primary users of the study's reports. The Department of State Lands has endorsed the project, and the Department of Health and Environmental Sciences submitted favorable reviews. The project could result in improved regulation and reclamation of heap-leach sites.

RECOMMENDATION:

A grant of up to $140,243 (does not include indirect costs of $28,444) is recommended contingent on DNRC approval of project scope of work and budget.

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APPLICANT NAME: Montana Bureau of Mines and Geology (MBMG)

PROJECT/ACTIVITY NAME: Land Application of Cyanide Leach Solutions

AMOUNT REQUESTED: $101,789

OTHER FUNDING SOURCES AND AMOUNTS: MBMG - $18,727

TOTAL PROJECT COST: $120,516

PROJECT DESCRIPTION:

Cyanide has been used to liberate gold from the host rock for several decades in Montana. The recent surge in precious metal mining in Montana can be correlated with the successful large-scale leaching of low-grade gold deposits in specially prepared leach pads.

Disposal of spent leach solutions has posed an operational and regulatory problem. One current practice is land disposal of the spent solutions, after oxidizing the residual cyanide. The effect of this procedure has not been satisfactorily demonstrated under actual field conditions at the mine sites. Instead, laboratory tests are used to evaluate whether land application should be permitted.

The purpose of this investigation is to test the assumption that the laboratory tests provide an adequate mechanism for protecting the environment from potentially toxic metals liberated by the process and from cyanide. The project study will consist of two integrated parts investigating the fate of cyanide and the mobility of metals in the field setting. The cyanide portion addresses problems associated with determining an adequate oxidant concentration to treat weak-acid-dissociable cyanide, simple cyanide, and total cyanide. Mobility of metals will be investigated using lysimeters as the primary sampling device.

TECHNICAL ASSESSMENT:

The applicant intends to select a mine site acceptable to all parties (MBMG, DSL, and, if necessary, USFS or BLM) for actual field testing. Pre-treated solutions will be collected at the site for control. Nests of lysimeters will be installed at depths of 1, 2, 3, 4, 5, 7, and 10 feet. Samples of pre- and post-treated solutions will be analyzed for cyanide by various methods to establish whether a relationship exists between mobile metals and "resurgent" cyanide. The resurgence phenomenon is one

where cyanide is "killed" (neutralized by a strong oxidizing agent such as calcium hypochlorite) in the fall, but excessive cyanide is found later on-- generally the next spring. One theory is that the cyanide is bound up very strongly in complex forms which are not broken down by the standard oxidants; upon resurgence, the cyanide facilitates the mobility of heavy metals.

At the lysimeter sites, cores would be taken for size distribution and metals content for comparison with column experiments. Rainfall would be measured. A neutron probe tube would be installed at each nest, and a tensionmeter nest would be placed at the central lysimeter nest in the application area. Use of the neutron probe and tensionmeter will allow measurement of water movement and should substantially reduce the number of samples needed. From these data investigators hope to develop, first, a method of determining cyanide movement at any site and, ultimately, guidelines for oxidizing both simple and complex cyanides under varying metal concentrations.

FINANCIAL ASSESSMENT:

Project duration is intended to be two years. Eight days of drill rig time are estimated to be needed for the installation of the 49 proposed lysimeters, plus two days' travel time for the driller and the drill rig. Because the site has not been determined, travel costs must be estimated on the high side; for example, if a mine site near Zortman, Montana, is selected, travel costs will be several times higher than for a site between Helena and Butte. Consequently, the projected travel costs, based upon an assumed site in the vicinity of Lewistown, Montana, may be in error.

Graduate student stipends and fee waivers are according to current school policy ($500 per month during the school year, and $1,000 per month during the summer if working full time on a project). Indirect costs amount to $10,628 (30 percent of wages, salaries, and benefits).

ENVIRONMENTAL ASSESSMENT:

The current practice of land disposal of spent cyanide solutions after oxidizing relies on laboratory tests to determine the soil absorption capacity. Actual field conditions have shown that secondary macroporosity is a major factor in the recharge of the groundwater systems. Field confirmation of this porosity problem and the resurgence phenomena is critical in establishing quantitative guidelines for land application. Little if any environmental impact would arise from this project.

PUBLIC BENEFITS ASSESSMENT:

A better understanding of the chemical reactions and attenuation under field conditions would be of help in addressing regulatory agencies' concerns. More controlled oxidizing for a variety of metal concentrations may prove to be a viable disposal alternative. If not, the public will benefit from the search for an alternative.

RECOMMENDATIONS:

A grant of up to $91,161 (does not include indirect costs of $10,628) is recommended contingent on DNRC approval of project scope of work and budget.

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APPLICANT NAME: State Lands, Department of (DSL)

PROJECT/ACTIVITY NAME: Middle Fork Warm Springs Creek Reclamation Program

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: DSL - $56,000 (Abandoned Mine Reclamation Program)

TOTAL PROJECT COST: $356,000

PROJECT DESCRIPTION:

The Middle Fork Warm Springs Creek site is located approximately 5 miles southeast of Clancy, Montana. The site is a scattering of exploration pits, surface disturbances, abandoned wood and metal buildings, wooden structures, shafts, an open adit, and numerous piles of barren mine waste. Disturbances and debris are scattered over an area 150 acres in size and are located on both banks of Middle Fork Warm Springs Creek and an unnamed tributary. The site rests on north- and west-facing slopes with gradients of 25 to 30 percent.

An open adit located at the lower portion of the site discharges 40 to 50 gallons per minute (gpm) of reddish-colored acid mine drainage. The applicant suggests that iron concentrations are very high. Data collected show increases in arsenic, iron, manganese, and zinc downstream from the site. These heavy metals are continually being leached into the stream.

Reclamation proposed includes disposing of mine structures, closing mine openings, recontouring the tailings, isolating the tailings from surface runoff, and revegetating the disturbed areas.

TECHNICAL ASSESSMENT:

The methods proposed to reclaim this site have been implemented numerous times by the applicant and represent state-of-the-art technology. Although limited information is presented on the nature and extent of pollution emanating from this site, the applicant theorizes that metal contributions to the stream will be significantly reduced, first, by routing adit discharge water around the mine tailings, and second, by regrading and revegetation of the tailings. Not addressed is what level of contamination stems from the adit discharge waters themselves, rather than from the tailings. It may be that the most dramatic reduction in pollutants from this site may be

attained by treatment of the mine water discharge. There seems to be some risk that the project could be implemented as proposed with little improvement in water quality.

With regard to environmental degradation, concentrations of copper and zinc appear to be of most concern at this site. Iron and manganese, although elevated, do not present a cause for concern except perhaps from a visual standpoint. It is not known whether the methods selected will significantly reduce pollutants to the creek.

The cost of reclamation seems excessive, especially when the primary source of pollutants has not been identified, nor has the plan addressed what could be the most severe impact -- adit discharge. Additional sampling data on both the adit discharge and tailings pile must be furnished before full funding of this project is justified.

FINANCIAL ASSESSMENT:

DSL is requesting grant funds only for the construction portion of this project. Construction will be a contracted service that will be awarded to a qualified contractor through competitive bidding. All other services, including those listed under Engineering/Administration and travel expenses (totaling $56,000), will be funded by the federal Abandoned Mine Reclamation Program which is administered by the Department of State Lands, Abandoned Mine Reclamation Bureau. Engineering, permitting, administration, and construction inspection will be contracted to a consulting engineering firm experienced in mine reclamation design. The DSL will provide in-kind contributions through its own staff and facilities for categories such as: salary and wages for any additional administrative and supervisory costs, supplies and materials such as office supplies, rent and utilities by providing existing office space, and any miscellaneous costs related to administration of the project.

Material and work requirements were determined using appropriate and standard engineering practices. Construction cost is estimated to be about $300,000 for the work scope as outlined in the application. A significant portion of the construction (approximately $250,000) is targeted for tailings regrading and revegetation. It appears high, unless a direct connection can be made between metals in the tailings and those in the stream, and, further, unless adit discharge is found not to contribute significantly to the elevated metal concentrations in the stream.

ENVIRONMENTAL ASSESSMENT:

If the major sources of pollution are identified and corrective action implemented, this project will result in significant improvement to the water resource. Long-term adverse impacts are not foreseen from this project. Short-term impacts occurring during construction can be minimized by careful design and planning.

PUBLIC BENEFITS ASSESSMENT:

The benefits of this reclamation project are unclear and need to be quantified through the submission of additional data. The environmental impacts of past mining operations, especially the visual impacts, will be eliminated. The continued impact on the water resources (that may otherwise deteriorate further) will also be reduced, but the extent is not known.

The tailings at the mine site continue to erode and are deposited in downstream floodplains. This sediment deposition is detrimental to lands adjoining the receiving streams. Reclamation will stop this continued property damage and the associated decrease in property value.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. The applicant must further document adit discharge water quality.
3. If data collected indicate that corrective measures other than those proposed in the application are needed, treatment of the adit discharge must be undertaken within the available budget.

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APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Public Lands Reclamation Project

AMOUNT REQUESTED: $134,060

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $2,700

TOTAL PROJECT COST: $136,760

PROJECT DESCRIPTION:

Butte-Silver Bow proposes to reclaim publicly owned lands contaminated by mine waste fill materials. Identity of the parties responsible for the dumping of these wastes is unknown.

Eight of the sites are presently used for public recreational purposes:

1. Arapaho Park
2. World Museum of Mining
3. Mandan Park
4. Lincoln School
5. Hebgen Park
6. Longfellow School
7. East Middle School

The remaining site (a public right-of-way located west of the Berkeley Pit) is proposed for grass and tree revegetation.

The reclamation activities proposed will remove hazardous mine wastes brought into public school yards, ballfields, and parks before the realization that these wastes present a potential health risk. The reclamation activities will ensure that the properties in question are safe and remain in public use, reclaimed to community standards.

TECHNICAL ASSESSMENT:

Reclamation techniques planned for these sites are similar to the methods used at the Northwest Ballfields and Emma Mine Park. The waste material will be excavated and removed from the sites; then a zeolite or lime layer will be placed under the topsoil. The sites will be reseeded, or sod will be applied. Trees will be planted and an irrigation system installed at the Longfellow School area, which will also be fenced. While it is too early to evaluate the success of these reclamation techniques at the previously reclaimed areas in Butte, the techniques are acceptable reclamation procedures that should minimize human contact with mine wastes.

The areas have not as yet been addressed for possible EPA remedial actions. An exact date for a Remedial Investigation/Feasibility Study under Superfund is unknown. According to this proposal, the waste materials are foreign to the project areas and were transported there by persons unknown. The ninth site, just west of Berkeley Pit, is the most likely to be affected by Superfund activities.

FINANCIAL ASSESSMENT:

The budget does not give a breakdown of costs by specific task at each site; therefore, it is not possible to evaluate the budget for each task.

The following budget (RDGP) is proposed:

Salaries and wages plus benefits	$ 68,510
Contracted services	22,000
Supplies and materials	15,500
Travel	750
Equipment	27,300
TOTAL	$134,060

The overall costs seem reasonable for these labor-and equipment-intensive reclamation tasks.

ENVIRONMENTAL ASSESSMENT:

The removal of contaminated materials will improve the areas and have a beneficial effect on the environment, improving the water, soil, vegetation, aesthetics, human health, and recreation in these areas. These efforts are a major goal of the local community to stimulate economic development of the Butte area. The short-term environmental impacts of soil disturbance and dust

will be minimized by prompt reclamation of the sites.

No known adverse long-term environmental impacts will result from the completion of these projects other than the effects of the removed contaminated materials on the approved disposal site, which has not yet been determined.

PUBLIC BENEFITS ASSESSMENT:

The activities proposed in this project will eliminate health hazards associated with mine waste materials at various sites in the community. Most sites are presently used for public recreational purposes. This use will not be changed by this proposal; in fact, use may increase with knowledge of removal of the contaminants. Clean-up of these publicly-owned properties will be most beneficial to the children who frequent these areas and are more at risk because of possible ingestion of the materials. Health officials have as a clear priority the removal of all mine waste materials from playgrounds or other areas frequented by children at play.

The proposed work will revitalize the parks or playgrounds, make them more attractive, and generally improve the neighborhoods in which they are located. Clean-up efforts at the World Museum of Mining will eliminate possible exposure to contaminants and benefit the thousands of tourists who visit this site each year.

RECOMMENDATIONS:

A grant of up to $120,800 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. DHES and EPA must determine that these clean-up efforts will not conflict with Superfund activities.

The Berkeley Pit planting strip is not recommended for funding because of potential conflicts with Superfund activities in this area.

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APPLICANT NAME: Natural Resources and Conservation, Department of, Conservation Districts Division

PROJECT/ACTIVITY NAME: Nonpoint Source Pollution Control in Montana

AMOUNT REQUESTED: $262,573

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $40,410
Conservation Districts - $8,000
WQB, DHES - $145,450
SCS - $46,080

Proposed EPA match - $345,200

TOTAL PROJECT COST: $847,713

PROJECT DESCRIPTION:

Control of nonpoint pollution is rapidly becoming a key resource issue in Montana. Agriculture, forestry, mining, and stream channel alteration contribute the principal nonpoint pollutant, fine sediment (sand, silt, clay), that, in the extreme case, causes turbid waters unsuited for fish production, recreation, and domestic use. Recently much attention has been focused on nonpoint pollution resulting from forest practices.

This nonpoint source (NPS) proposal presents a plan for developing a series of 16 small projects which would demonstrate methods for controlling sedimentation from agriculture, forestry, mining, and channel modification. A public education component would use videos, public forums, classroom presentations, and publications to disseminate information on nonpoint pollution and methods for control.

TECHNICAL ASSESSMENT:

Nonpoint sources of water pollution degrade a larger number of river and stream miles and more lake areas in Montana than do point sources, accounting for 95 percent of the total water pollution in the state. Sediments, salinity, dewatering, and acid mine drainage are the pollutants of greatest concern.

Erosion of sediments into surface waters is the most pervasive nonpoint source problem. Erosion occurs as a result of intensive grazing and cropping practices, timber harvesting activities, mineral exploration and development, hydraulic modification, and construction activities. When such activities infringe on riparian zones, they destabilize streambanks and aggravate erosion. The excess stream sediments degrade aquatic habitats and reduce channel stability.

Agriculture is the primary NPS category in the state, contributing approximately 46 percent of the total NPS pollution to Montana waters. Because of the poor economic condition of the agricultural sector over the past few years, current cost-share programs designed to address NPS pollution have been used little -- in most cases, farmers and ranchers have been unable to produce matching funds. Further, local conservation districts (CDs), which are the designated local NPS control agencies and which have historically sponsored NPS control projects, are finding it increasingly more difficult to secure grants for such projects.

Through a cooperative effort of the DHES (WQB), DNRC (CDD), SCS, and other agencies, this proposal will develop specific NPS demonstration projects in each of the following categories: agriculture, mining, silviculture, and hydraulic modification. Selection of priority streams and watersheds for implementation of demonstration projects will be based on: the severity of the problem as indicated in Montana's 1988 NPS assessment report, the

potential for control, and local interest and participation. Once projects are identified, staff from the DNRC (CDD), DHES (WQB), and SCS will evaluate the problem areas and develop site-specific best management practices (BMP) to mitigate NPS problems.

BMP are as diverse as the problems they address, consist of anything done to mitigate impacts of resource development, and may be applied during the planning or development phases or after the activity is completed. BMP may consist of practical planning (e.g., recognizing fragile soils or unstable hill slopes and not developing them or developing with special protective measures). In those instances where resource damage occurs, BMP may comprise structural (such as revetment, sediment traps) and non-structural (such as revegetation, irrigation water management, grazing management), site-specific remedial measures. The proposal is not clear as to the specific nature of each demonstration project. It appears that the majority of the projects will focus on streambank stabilization and riparian zone management.

Educational materials (including videos and literature) on NPS pollution will be developed and an educational program conducted statewide. The applicant proposes to incorporate NPS materials into the following types of activities: teacher training, youth camps and groups, county fairs, CD supervisor workshops. Project sponsors expect that this effort will result in increased public awareness of NPS pollution and widespread voluntary implementation of BMP.

Reviewers were critical of this proposal, yet supportive. The Section 208 Program of the late 1970s, which targeted control of NPS pollution, used a similar approach to encourage voluntary implementation of BMP. This approach was only partially successful, to an extent because of inadequate federal funding to implement BMP. This proposal would fund implementation of BMP on demonstration projects, but future implementation costs could remain a burden to widespread implementation.

Another concern is that the proposal might duplicate past effort. Today's resource manager is armed with an impressive array of BMP for sediment control. The effectiveness of many BMP, such as management of riparian zone agricultural use (cultivation, irrigation, grazing), is proven beyond a doubt. The same is true for many streambank stabilization methods, although there is room for experimentation, refinement, and development of pragmatic approaches. However, the overall problem is not so much one of demonstrating that BMP are effective as it is coming up with a mechanism for ensuring the implementation of appropriate BMP in a given situation.

The demonstration project approach does not seem particularly appropriate for forest practices. There are not a lot of clear candidate sites for forest practices rehabilitation projects. Time has healed many sites, while other land uses (e.g., grazing) have complicated the direct connection between forest practices and stream impacts at other sites. Given the progression of new and large-scale logging operations into headwater drainages, perhaps the emphasis of a forestry nonpoint

source program should be the prevention of adverse impacts from new operations. The prevention approach could include identification of sensitive drainages by some set criteria (e.g., water quality considerations, fisheries values, recreational use, magnitude of harvest, potential for cumulative effects, etc.), a formal mechanism to bring specialists on site to work with landowners to head off potential problems, and a cooperative monitoring program.

In spite of these criticisms, reviewers agreed that the proposal has significant merit. It emphasizes a positive, cooperative interagency approach to controlling NPS pollution. Public education and awareness of NPS pollution and how to prevent it are crucial to any control effort. This is especially true for agricultural projects where conservation district personnel and volunteers are often active locally and in touch with neighbors having similar experiences. Success in improving riparian conditions at one site could effectively be transferred to other sites in a watershed. Ultimately, landowners could come to realize the benefits in terms of land and water quality conservation, and the incentives for voluntary reduction of NPS pollution would increase. Resourceful farmers and ranchers are much more likely to implement BMP if they see the results firsthand.

FINANCIAL ASSESSMENT:

With the enactment of Section 319 of the federal Water Quality Act of 1987, significant federal financial assistance may become available to states with EPA-approved NPS pollution control programs. This proposal seeks state funds to secure federal matching funds to implement a voluntary NPS control program.

Up to 16 specific demonstration projects will be developed in cooperation with various conservation districts if federal matching funds become available. If not, a reduced program will be implemented. At present, federal funding has been authorized under Section 319, but federal funding has not yet been appropriated by Congress. Whether federal funding will eventually be available to match state funds is uncertain at this time. This proposal asks for federal funding for only 40 percent of the project cost, but the total possible federal match is 60 percent.

The total project cost is $847,713. Funding sources include: $40,410 (applicant); $8,000 (conservation districts); $145,450 (DHES); $46,080 (SCS); $262,573 (RDGP grant) and $345,200 (proposed EPA match). The budget breakdown includes: personnel services, $270,091 (CD administrators; CDD/DNRC, WQB/DHES, and SCS staff); contractor services, $280,000 (labor, equipment, consulting engineers); supplies and materials, $240,000 (fencing, riprap, vegetation, etc.); communications $11,300; travel, $14,322; and miscellaneous repair and maintenance, $32,000. Given that specific demonstration project designs are not currently available, it is difficult to evaluate cost-effectiveness at this time.

ENVIRONMENTAL ASSESSMENT:

Demonstration projects developed under this proposal may have a short-term adverse impact where in-channel modifications are required. These can be largely mitigated by careful timing of construction work. Within the demonstration project sites there should be a net improvement in channel stability, water quality, and aquatic habitat over the long term.

PUBLIC BENEFITS ASSESSMENT:

Public benefits include increased awareness of NPS pollution. If the proposed voluntary demonstration/education approach is successful in encouraging widespread adoption of BMP, then a wide variety of public benefits will accrue over the long term. These include reduced sediment loads in streams and improved channel stability, water quality, and aquatic habitat.

RECOMMENDATION:

A grant of up to $262,573 is recommended for this project contingent on:

1. DNRC must approve a detailed scope of work and budget.
2. The applicant must request the full 60 percent share of the federal matching funds (rather than the 40 percent given in the grant application). If a 60 percent match is received, then the RDGP grant amount should be reduced accordingly.
3. The applicant must develop a rigorous monitoring program to document the effectiveness of demonstration projects over the long term.

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APPLICANT NAME: Toole County

PROJECT/ACTIVITY NAME: North Toole County Reclamation Project

AMOUNT REQUESTED: $299,040

OTHER FUNDING SOURCES AND AMOUNTS: Toole County - $38,200

TOTAL PROJECT COST: $337,240

PROJECT DESCRIPTION:

In northern Toole County, extensive development of oil production facilities began in 1922. It is estimated that several thousand wells were drilled prior to 1954, when regulations of oil and gas operations became effective. Frequently, well placement was ten wells per 40 acres, and a total area of over 13,000 acres was involved. No regulations at that time addressed environmentally safe methods of disposal of waste, oil, and brines. Therefore, these wastes were commonly dumped on the land surface. Also, as oil production decreased,

the population declined, leaving many facilities abandoned. The result today is the presence of numerous dilapidated structures and remains of oil field production equipment. Soils contaminated by past disposal remain unproductive. The condition of the oil field is a significant threat to public health, soil productivity, water quality, and economic opportunity in the area. Removal of structural debris and reclamation of impacted soils are needed.

The objectives of this ongoing project are to continue inventory and assessment of sites needing reclamation, characterize groundwater quality in the area, accomplish removal and burial of abandoned buildings and equipment, continue soil reclamation research, and apply results to other sites. The work conducted in this project will encompass approximately 1,200 acres.

The project is administered by a five-member board representing agricultural and oil industry interests. The procedures proposed include site assessment, removal and burial of structures and debris, drilling of monitoring wells, and application of soil treatments, with reseeding as necessary. A final product of this effort includes a reclamation planning guide which will be applicable to similar sites in Montana.

Over the last two years, Toole County has removed debris at 15 sites and instituted soil reclamation studies at two of them. Techniques learned from these studies will be applied to future clean-up and soil reclamation.

TECHNICAL ASSESSMENT:

Reclamation of the entire area, of over 13,000 acres, is the eventual goal of the North Toole County Reclamation Project. Previous RDGP grants were awarded by the legislature in 1985 ($298,130) and 1987 ($150,000). Work conducted thus far has been successful.

Several alternatives to the proposed reclamation -- e.g., soil removal and replacement, and use of petroleum-tolerant vegetation -- were discussed and are not feasible. The methods proposed by the applicant represent a logical and necessary approach to the problem of lands contaminated by oil field wastes and debris. Project coordination with Montana State University, Montana Salinity Control Association (MSCA), SCS, local extension service, and others will ensure development and implementation of state-of-the-art methods in the area of oil field reclamation. The project is a highly appropriate use of RDGP funds.

FINANCIAL ASSESSMENT:

Of the $299,040 RDGP funds requested, contracted services for soil and water analyses and construction clean-up account for $188,456, with $51,260 in salaries. The remainder would cover travel, benefits, minor miscellaneous costs, and a 10 percent contingency. Toole County would direct most of its contribution to salaries, rent, and utilities. Overall, the salaries for the administrative assistant and secretary represent 25 percent of the total budget.

ENVIRONMENTAL ASSESSMENT:

Significant long-term benefits would result from clean-up of this impacted area. The benefits would include improved soil and water quality, wildlife habitat, aesthetics, and, over the long term, the return of useless land to a condition suitable for grazing.

PUBLIC BENEFITS ASSESSMENT:

The local economy would benefit from an improved tax base, and local residents and all Montanans would benefit from mitigation of environmental damage and removal of hazards.

RECOMMENDATIONS:

A grant of up to $299,040 is recommended contingent on:

1. DNRC must approve the scope of work and budget.
2. All technical aspects must be closely coordinated with DHES, Water Quality Bureau and Solid and Hazardous Waste Bureau.
3. Funding can be expended for design, construction, the MSCA subcontract, travel, supplies and materials, and communications only. However, salaries and fringe benefits for employees are excluded and must come from previous grants or other sources.

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APPLICANT NAME: Montana State Library

PROJECT/ACTIVITY NAME: Montana Natural Heritage Program

AMOUNT REQUESTED: $197,607

OTHER FUNDING SOURCES AND AMOUNTS: Renewable Resources Development Program (DNRC) - $99,450 (if funded)

TOTAL PROJECT COST: $297,057

PROJECT DESCRIPTION:

The Natural Heritage Program provides a comprehensive inventory of significant elements of the state's natural features that are exemplary, rare, or endangered at the state or national level. These elements include plant and animal species, plant communities, aquatic systems, critical habitats and other ecological features of significance, and geological features.

The inventory data are compiled from detailed review of published and unpublished sources, as well as from agencies, organizations, the scientific community, and individuals. This is followed by continual update and refinement of the

information, including field surveys. Data are obtained on the occurrences, number, condition, endangerment, location, and land ownership status of significant elements (rare or exemplary plants, animals, and communities). The data are stored in an integrated data management system. Map files, manual files, and computer files keep the information well organized and readily accessible. The resulting data base is particularly useful when a defined geographic area must be studied for preparing environmental impact statements, planning for facility siting, or considering reclamation issues.

TECHNICAL ASSESSMENT:

The Natural Heritage Program will be operated under contract with The Nature Conservancy. The Natural Resource Information System (NRIS) at the State Library will administer the contract. The project is managed by a coordinator, who is the contractor's liaison with the state. Other staff include a botanist, community ecologist, and data manager; the coordinator also serves as the project zoologist. Work is guided by the contract with the State Library and input from the NRIS Director and NRIS Advisory Committee. The Montana Natural Heritage Program's plans are to:

1. Continue to update the ranked checklist of all Montana vertebrates and of high-ranking plants. (Ranks are based on the system utilized by The Nature Conservancy in 49 other heritage programs throughout the United States.)
2. Maintain and continue to revise the list of more than 600 computerized abstracts on each vertebrate in the state.
3. Revise, update, and expand the site-specific element occurrence records; the present level is 1,905.
4. Continue to update and expand the listing of more than 2,200 pertinent secondary sources of information.
5. Provide a status report on the more than 1,900 high-ranked elements processed into the system, maintain access to the data base containing these elements, and provide output organized by county, by latitude and longitude, by township, range, and section, or by any of these.

The Natural Heritage Program provides a valuable data service to a variety of state, federal, and private users. The program has responded to 547 information requests through September 1988. Providing timely, cost-effective, natural resource information leads to more efficient resource planning, conflict resolution, and impact statement review. Training materials and demonstrations will be provided to users, and a direct access mode of service is being evaluated for potential use.

FINANCIAL ASSESSMENT:

The proposal budget reflects continued funding at the

present level for two years. The total budget for the NRIS program for this period is $482,268.

This grant requests $197,607 to support 66 percent of the Natural Heritage Program (NHP) staff and approximately 10 percent of the NRIS support staff and operating expenses. This budget assumes no increases for salaries. The total budget for the Heritage Program is $297,057.

The NRIS program has received funding in the past from the following sources:

STATE FUNDS	1986/87	1988/89
Dept. of Natural Resources & Conserv.		
(Resources Indemnity Trust grant)	$225,561	$177,970
(Water Development grant)		97,712
Dept. of Fish, Wildlife & Parks		
(License fees)	75,000	50,000
FEDERAL FUNDS		
Dept. of Health & Environ. Sciences		
(Environmental Protection Agency)		314,145
Dept. of State Lands		
(Office of Surface Mining)	150,000	30,000
Montana Rivers Study (FWP)		
(Bonneville Power Admin.)	15,214	37,944
Other (USFWS, USFS)	24,500	28,700
PRIVATE	75,140	22,637
TOTALS:	$565,415	$759,108

The following sources are being pursued for funding in the 1990-91 biennium.

Carry-over Funds - Of the $759,108 obtained for the 1988-89 biennium, approximately $35,000 is expected to be carried forward into FY90 to complete work.

General Funds - General funds in the amount of $66,388.

Office of Surface Mining - The Office of Surface Mining will provide a minimum of $30,000 with expectations to increase the level somewhat.

Department of Fish, Wildlife and Parks (License fees) - Although no amount has been specified, a minimum of $50,000 is expected, sustaining current levels.

Private Funding/Subscription Fees - The Nature Conservancy has not made a formal commitment for FY90-91 funding. As for other private, non-firm sources, it is estimated that $25,000 in user subscription fees or small data management contracts will be obtained by NRIS during the 1990-91 biennium.

The NRIS program will continue to solicit other outside

sources of funding; as the data system matures, a schedule of user fees for non-state agency users will be considered. However, user fees may affect state economic development to the extent that they would prevent entrepreneurs and developers from gaining access to information needed to support new projects. Consequently, it is believed that subscription fees and small service contracts are better alternatives than individual transaction fees, and NRIS will be exploring the possibility of selling subscriptions to and/or negotiating contracts with frequent users.

Department of Health and Environmental Sciences

NRIS has secured a FY88 contract for $152,523 and a FY89 contract for $214,963 to develop a Geographic Information System (GIS) in support of the Department of Health and Environmental Sciences (DHES) and Environmental Protection Agency (EPA) Clark Fork Superfund Project. The project is funded through September 1989 with negotiations underway to continue the effort through at least September 30, 1991.

Montana Rivers Study (DFWP Interagency Agreement) - NRIS secured $25,944 for FY88. This contract will be amended for FY89 with an additional $12,000 for a total of $37,944 for the 1988-89 biennium. This project is expected to be funded for an additional two years (FY90 and 91).

Renewable Resources Grant

Core Natural Resource Information System - $99,806 for FY 90 and 91

Core Natural Heritage Program - $99,450 for FY90 and 91

Water Development Grant - $45,510 for FY90 and 91

ENVIRONMENTAL ASSESSMENT:

The proposed project will not result in the construction of facilities or any activity that will have a direct negative impact on the environment. The proposed project is designed to provide for the long-term management and compilation of information on natural resources on behalf of public and private users. Significant positive impacts are expected to result from the project because of an increased understanding of the state's renewable resources and an increased ability to apply this knowledge to the conservation, management, utilization, development, and preservation of the water, land, vegetation, fish, wildlife, recreational, and other renewable resources in the state. In particular, the project will have the effect of reducing environmental impacts of future natural resource projects statewide.

PUBLIC BENEFITS ASSESSMENT:

The primary benefit of this project is that it will improve public access to natural resource data. Accurate, reliable, and adequate natural resource information leads to public benefits by improving the planning and implementing of development activities that may affect natural resources.

Since this program is accessible to all citizens of Montana and includes data from throughout Montana, the benefits will be experienced statewide.

RECOMMENDATIONS:

A grant of up to $197,607 is recommended contingent on DNRC approval of the project scope of work and budget.

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APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Ophir Mine Reclamation Project

AMOUNT REQUESTED: $185,027

OTHER FUNDING SOURCES AND AMOUNTS: Butte-Silver Bow - $4,600
Atlantic Richfield Co. (ARCO) - $75,700

TOTAL PROJECT COST: $265,327

PROJECT DESCRIPTION:

The applicant proposes to reclaim the abandoned Ophir Mine site by constructing a park. The site is covered with mine tailings and remnants of ancillary mine buildings which are both unsightly and hazardous. The unvegetated ground promotes dust and surface drainage problems in the area, which, in turn, cause tailings containing hazardous materials to be deposited on public streets and in the storm drainage system. Street traffic further aggravates the dust problem, resulting in airborne contaminants.

The Ophir Mine site is approximately one mile west of the Berkeley Pit in a primarily residential area. It is bordered on the west by a commercial zone and on the south by a vacated grade school. The neighborhood to the north and east, referred to as "Central Butte," is one of Butte's older neighborhoods, built primarily as a working class neighborhood. Today it is composed of approximately 96 percent low- to moderate-income families. Minorities, elderly, and female-headed households constitute a large percentage of the population.

Residents are faced with a blighted neighborhood that continues to decay and compound the health and safety problems. The Ophir Mine site is a major contributing factor to these conditions and one reason for the apparent lack of investment and pride in the area. Significant concentrations of arsenic, chromium, iron, manganese, lead, zinc, free silica, and sulfate were found in street dust below several mine dumps sampled under an Abandoned Mine Reclamation Project of the Department of State Lands. Ophir Mine was one of these sites. A stabilization and reclamation program was recommended for these mine dumps to reduce the amount of material eroded from the dumps and deposited on the city streets. When the dust becomes airborne, it presents

a significant health hazard.

A neighborhood survey, completed by Renewable Technology, Inc., (RTI) of Butte, identified the need for a park at the Ophir Mine site. The proposed park's design and development follow the suggested plan submitted by RTI. The plan calls for removal of the mine tailings by ARCO prior to park construction. The area will then be limed, topsoiled, and revegetated with trees, shrubs, and grasses.

TECHNICAL ASSESSMENT:

At the time of this writing, remedial action activities that will be required under CERCLA are not finalized. Remedial action could include most of the work being proposed here, i.e., disposal of mine wastes, liming, topsoiling, and revegetation. It is not likely to include park equipment, curbing, utility relocation, parking area, and irrigation. A recommendation on the amount of RDGP funds to be appropriated for this project is dependent on the timing and scheduling of this project under CERCLA, versus the availability of funding under RDGP. If the CERCLA action comes relatively soon, then a large portion of this grant would be unnecessary. If, on the other hand, CERCLA action is not likely to occur until some more distant time, then it can be reasoned that the project benefits to accrue to the residents of Butte during the interim justify funding. This approach was used in past RIT-funded activities in the Butte Hill area and should work well for the proposed project. As CERCLA actions become more clear in the next few months, the exact amount of funding can be determined.

Overall, the project is part of an aggressive community effort to mitigate the effects of past mining and revitalize the older neighborhoods and central business district. The development of the area into a public park ensures a usable and continuing public use of land. According to the surveys taken by RTI and the applicant, the majority of residents indicate that the site could best be used as park space. Additionally, material has been presented indicating that similar efforts funded by RIT have had successful results. This undertaking should similarly spark renewed economic interest in the area.

The reclamation activities planned for this site are similar to the methods used at the Northwest Little League Field and Emma Mine Park which received a RIT grant in 1985.

FINANCIAL ASSESSMENT:

Salaries and benefits are estimated at $57,147, contracted services at $45,124, supplies and materials at $36,204, travel at $1,400, and equipment at $45,152. Butte-Silver Bow will donate $4,600 in communication, rent, and utility expenses. ARCO's contribution for waste removal is expected to total $75,700.

The overall costs, based on similar Butte construction projects, seem reasonable for these labor- and equipment-intensive reclamation tasks.

ENVIRONMENTAL ASSESSMENT:

Short-term negative impacts, such as dust and noise, may

result from the construction activities. These impacts will be minimized because this project will remove mine wastes, treat the soil on the site, place topsoil, and revegetate the area with grasses and trees in approximately nine months. These activities will have a beneficial impact on human health and safety and on public facilities, such as the storm drainage system, by reducing sediment, dust, and other contaminants originating from this abandoned mine site.

The clean-up of the Ophir Mine site will provide a park that will improve the aesthetics and recreational opportunities of the neighborhood and community. Economic development may be encouraged by this investment in improvement of the neighborhood.

No long-term adverse environmental impacts are expected to result from this project.

PUBLIC BENEFITS ASSESSMENT:

The activities described in this project not only mitigate the environmental damage, but also eliminate the public health and safety hazards associated with the site. Public facilities, such as the storm drainage system, benefit through reduced sediment. Taking effective measures to reclaim mine areas within the urban area provides a more stable environment for economic growth. Residents or business owners are thus encouraged to invest in property improvements, and the effect multiplies.

Butte-Silver Bow has witnessed this effect on the city's Northside, where reclamation efforts at the Anselmo and Gagnon Mine sites, combined with RIT-financed reconstruction of the Northwest Little League Field, spawned neighborhood interest in revitalizing the entire area.

RECOMMENDATIONS:

A grant of up to $185,027 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. Matching contributions are provided by Butte ($4,600) and ARCO ($75,700).
3. Butte-Silver Bow will obtain a deed or long-term lease for the project area.
4. The site will be sampled to ensure complete removal of toxic wastes before placement of clean materials and revegetation.

APPLICANT NAME: Montana Bureau of Mines and Geology (MBMG)

PROJECT/ACTIVITY NAME: The Use of Natural Zeolites in Reducing Heavy Metal Concentrations at Mining Operations and Impacted Lands

AMOUNT REQUESTED: $169,568

OTHER FUNDING SOURCES AND AMOUNTS: MBMG - $42,275
Montana Tech Mineral Institute Program - $8,128

TOTAL PROJECT COST: $219,971

PROJECT DESCRIPTION:

A zeolite is a hydrous silicate that can act as an ion-exchanger. The purpose of this project is to investigate the use of naturally occurring zeolites in: (1) facilities for containing heavy-metal-laden waters or soils -- e.g., tailings impoundments and disposal sites, and (2) reclamation practices at heavy-metal-contaminated sites -- e.g., reclamation of metal-contaminated soils like those in East Helena, Columbus, and Butte and vicinity. If justified by the results of these studies, the feasibility of developing Montana zeolite deposits will be evaluated. Phase I of the study would be carried out through lab experiments to characterize acid effluent, sediment size, and zeolite size best suited to handle the effluent with subsequent column tests to check performance. Different effluents would be used with different flow rates to establish the appropriate method of exchange and optimum contact time.

Phase II would involve construction of a filter dike at a problem site. Monitoring would be conducted to assess flow rates, water quality (to determine zeolite quantity necessary), point of zeolite saturation for ultimate disposal, and downgradient water quality (to determine the chosen method's success).

Phase III would involve adding zeolite amendments to contaminated soils to mitigate metal toxicity and aid in site reclamation. Soil and water samples would be analyzed to determine the method's effectiveness.

TECHNICAL ASSESSMENT:

The applicant prefers commercially available zeolite and has elected not to consider alternative zeolite sources. Zeolites, as with all exchange media, have a high cation exchange capacity, but certain locally available zeolite types may better absorb a given mixture of metals than would the commercially available ones to be used by the applicant. Evaluation of

Montana's zeolites is to be conducted concurrently with this study.

The absorption capacity of a given zeolite is critical to its use in mitigating a specific acid mine effluent. The proposal does not clearly define the maximum absorption capacity of zeolites by either weight or volume. These data should be established experimentally before field test of a filter dike barrier.

FINANCIAL ASSESSMENT:

Personnel costs include salaries at $76,056 and benefits at $25,098, or 33 percent. Drilling and analytical costs are $59,950. An additional 30 percent of combined salaries, wages, and benefits is included as indirect and totals $20,330.

ENVIRONMENTAL ASSESSMENT:

Little if any impact to the environment would result from this project. However, determining what to do with the absorbed metals may need a final solution before zeolites are used in the field. In any case, removal of the zeolites will involve short-term sediment loading to the aquatic environment, as will placement of them in the barrier dikes.

PUBLIC BENEFITS ASSESSMENT:

If the proposal's methods are found to be effective, they may be applied commercially by industry. If so, removal of metals and other toxic elements will benefit the public through improved water supplies, fisheries, soil conditions, and attendant vegetation.

RECOMMENDATIONS:

A grant of up to $149,238 (does not include indirect costs of $20,330) is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. Laboratory experiments shall focus on Montana zeolites with concurrent economic analysis of using Montana zeolites versus other commercially available zeolites.
3. Field studies and applications/demonstrations are contingent upon favorable results of the laboratory experiments and economic analysis.

APPLICANT NAME: Montana Board of Oil and Gas Conservation

PROJECT/ACTIVITY NAME: Broadview Well

AMOUNT REQUESTED: $65,600

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $65,600

PROJECT DESCRIPTION:

In 1922, the Security Producing Company of Minneapolis, Minnesota, qualified to do business as a Montana corporation and drilled an oil well west of Broadview, Montana. The company completed drilling in January 1924 and was last heard from on March 28, 1929.

Over the years, saline water from the well has destroyed the casing integrity, and the flowing, saline water is eroding the surface around the well and a nearby drainage. Although surface flow is not reaching the landowner's reservoir, the water is entering the shallow alluvium and will ultimately affect the reservoir.

The Board of Oil and Gas Conservation (BOGC) plans to reenter the well, recover any tools left in it, and cement off the leaking formations.

TECHNICAL ASSESSMENT:

The Board of Oil and Gas Conservation has described in detail the problem and the measures that need to be taken to recover tools from the well and plug off the hole. Photographic documentation shows the remnants of a wooden and concrete cellar structure surrounded by a large area devoid of vegetation. Downstream of the well site the drainageway is barren for 50 to 75 feet on each side and eroding where it nears the ranch reservoir. The ranch reservoir is only one mile from Broadview Pond. Both the reservoir and pond are used by waterfowl, and Broadview Pond is apparently used by the community for fishing.

The well would be cleaned and plugged at all producing and water-bearing formations to protect existing groundwater supplies in the area. The landowner has not expressed any interest in using the well as a water source from the Eagle Judith River Formations. Following plugging, the site would be cleaned up and seeded to grass. The workplan is appropriate and follows established practices.

FINANCIAL ASSESSMENT:

Project cost estimates are well documented and include rental fees for equipment necessary to recover tools from the well bore. Drilling rig costs are $36,000 for a well 2,500 feet

deep. Drilling mud and gel total $4,256 and the recovery tool rental, $3,050. The remainder of the costs ($22,294) cover plugging cement, engineering, reclamation, and other equipment necessary to complete the job. Costs may vary depending on what is found down the bore; they could be higher if problems are encountered or lower if the bore is relatively clean. The per hour and unit costs for services are in line with industrial standards.

ENVIRONMENTAL ASSESSMENT:

Little, if any, adverse impact would result from plugging activities. Some sediment may be generated during early phases, but the real gain comes in eliminating the saline water contamination potential to surrounding wells and most certainly to the ranch reservoir and Broadview Pond.

PUBLIC BENEFITS ASSESSMENT:

The original operator's last contact with the state was in 1929, and that company has no known connection to any existing operator. There is a real threat to fifteen existing water wells around the Broadview Well as well as to the two surface water impoundments. Additional benefits include public safety and elimination of a hazard to livestock.

RECOMMENDATIONS:

A grant of up to $65,600 is recommended for this project contingent on approval of a scope of work and budget by DNRC. If funds are available in the Abandoned Well Reclamation Fund, the BOGC shall use these funds first, before the expenditure of RDGP grant funds.

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APPLICANT NAME: Montana Salinity Control Association

PROJECT/ACTIVITY NAME: Salinity Control: A Nonpoint Source Pollution Management Program

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: Conservation Districts Division, DNRC - $141,302
Landowner Contributions for Remainder of Total

TOTAL PROJECT COST: $599,200 (Estimated)
Actual amount is dependent on landowner participation

PROJECT DESCRIPTION:

The Montana Salinity Control Association (MSCA) was formed in 1985 and is composed of three organizations representing a thirty-three county area in Montana. The MSCA staff provides technical assistance to individuals or communities with saline seep problems. The educational programs provided by the MSCA focus on prevention and reclamation of saline seeps. The MSCA interdisciplinary technical field team works on a farm-by-farm basis using state-of-the-art methods in recharge area identification, hydrogeologic investigation, intensive cropping, and soil and water reclamation.

Twenty-six new applications for assistance are currently on file. The applicants are willing to pay part of the cost of implementing a hydrogeologic investigation and a saline seep reclamation plan. New applications are continually being generated by MSCA education programs, SCS conservation planning efforts, and word of mouth among farmers. MSCA is requesting funding to initiate fieldwork and planning on at least 50 new sites.

Saline seeps and groundwater salinity are dynamic nonpoint source pollution problems requiring long-term management. Control of nonpoint source pollution will become more important as Section 319 of the Clean Water Act is implemented. When this occurs, MSCA funding may generate additional federal matching dollars.

TECHNICAL ASSESSMENT:

The techniques to reduce or eliminate saline seep seem to be well documented in this proposal.

This program is well supported by resource professionals and land management agencies. However, there still appears to be a problem with acceptance of this program by the agricultural community. The reason may be that the solution is labor-intensive, expensive, and requires long-term attention to prevent future seeps. In addition, the alternative agricultural practices used in reclamation result in forage products that are not currently as marketable as the cereal grain crops generally grown in these areas.

FINANCIAL ASSESSMENT:

The breakdown of the budget proposed is: 53 percent for salaries, wages, and benefits; 20 percent for supplies, materials, and office expenses; 14 percent for equipment; 7 percent for travel, and 6 percent for miscellaneous.

The salaries of the staff are high compared to those of other state workers in similar professions. The overall budget could be reduced by maintaining current salaries instead of allowing the proposed increases.

Since the landowners receive the primary benefits from this program, increasing the landowners' contributions would be one way to make this program self-supporting. Currently, the landowners are asked to contribute about 30 percent of the costs of reclamation.

ENVIRONMENTAL ASSESSMENT:

No adverse environmental impacts should result from this project.

The major benefit is the reclamation and protection of the soil resource. With improved soil conditions, the quality of both groundwater and surface water should also improve through a decrease in salt concentrations. Improved water and soil quality can result, along with increased forage for wildlife species. Improved water quality will also benefit aquatic species. The development of agricultural practices that provide for saline seep control and conservation of the soil resource is the major environmental benefit of this program.

PUBLIC BENEFITS ASSESSMENT:

The private landowners receive the main benefits from this program through increased production and higher returns from the reclaimed lands. Public benefits result from the soil resource and water quality improvements.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended for this project contingent on:

1. DNRC must approve the project scope of work and budget
2. RDGP contributions for salaries will not exceed 1988 levels
3. Landowners must contribute at least 40 percent of the costs of saline seep reclamation

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APPLICANT NAME: Montana State University, Reclamation Research Unit

PROJECT/ACTIVITY NAME: Toxic and Residual Cyanide Effects on Soil Microorganisms, Invertebrates, and Plants at Heap-leach Mine Sites

AMOUNT REQUESTED: $127,258

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $127,258

PROJECT DESCRIPTION:

In Montana, precious metal mining should be balanced with minimal impact to the environment. Heap-leach mining for gold with a toxic cyanide compound is rapidly increasing because of its cost-effectiveness. With certain climate conditions, however, some heap-leach mines have released toxic solutions of cyanide or sprinkle-irrigated treated solutions of cyanide onto

natural soils. Inevitably, controlled land applications will be needed in the future, but little is currently known about their impact on the soil and aboveground biota. Similarly, little is known about the effect of residual cyanide in recently reclaimed heap-leach pads.

In the first phase of the study, soil cores from the field site will be analyzed for soil properties and microorganism activity. After application of untreated and treated cyanide solutions and amendment with carbohydrate-based materials to enhance recovery of the microorganisms, the soil will be measured for microorganism activity and cyanide levels.

In the second phase, a cyanide spill and land application in the field will be simulated, with addition of appropriate amendments. Early spring and mid-summer spills will be evaluated. Soil microorganisms, invertebrate and plant activity, and regeneration will be monitored for 18 months.

In the third phase, the effects of residual cyanide on soil microorganisms, invertebrates, and plants will be evaluated at two recently reclaimed heap-leach sites. Sampling and evaluation will continue for 20 months.

The study will increase understanding of the impact of cyanide spills, land applications, and residual cyanide on soil and aboveground biota, which should improve regulatory control, public knowledge and attitude, and reclamation techniques.

TECHNICAL ASSESSMENT:

As long as cyanide heap-leach mining continues in Montana, land application will be needed because of unforeseen hydrologic conditions, final reclamation, or human error. Regulatory agencies, mining companies, and consultants should know the effect of spills or land application on the soil and biotic communities. If serious impact is detected in this study, regulatory agencies could require improved design of mining facilities and/or effective land application treatment. Regulatory agencies, mining companies, and consultants also need methods to repair or mitigate damage from spills and land application.

The second phase of the study is needed to develop baseline information on the effects of residual cyanide. Although cyanide heap-leach mines have operated for decades, the growth and regeneration of biota on derelict sites has not been determined. In Montana's reclaimed leach pads, residual cyanide levels of .05 milligrams per liter (mg/l) are considered non-toxic. Yet, these toxicity levels are based on laboratory experiments and do not include such other sources of stress as drought and herbivores.

Non-toxic levels may still affect the behavior, physiology, and population of a variety of organisms. In addition, the .05 mg/l level is for weak-acid dissociable cyanide. Much of the cyanide in reclaimed pads may form strong complexes with trace metals. Eventually, most of these cyanide-trace metal complexes degrade, thereby releasing free cyanide and trace metals. The stability and persistence of a reclaimed heap-leach site depend on a balanced soil/plant system unaffected by residual cyanide and co-occurring trace metals. Information on the environmental

effects of cyanide is urgently needed for both small (less than 5 acres) and larger operations. Montana has many active and proposed cyanide heap-leach sites, and many older mines have been or soon will be deactivated, legally or illegally.

These potential problems are chronic and will continue. This study is intended to lead to improved protection of public resources, prevention of property damage, conservation of natural resources, and long-term community productivity and stability. It should also alert regulators and industry as to whether existing design and permitting need to be improved.

FINANCIAL ASSESSMENT:

The budget appears well developed and adequate; however, travel costs may need revision based on the field sites selected. Indirect costs amount to $22,867.

ENVIRONMENTAL ASSESSMENT:

Applying cyanide solutions would affect the soils and plants in field plots. Limiting application to the top 20 centimeters (cm) of soil should protect the groundwater. The plots will be reclaimed to the diversity and productivity of adjacent areas upon study completion. The study of residual cyanide will not have an adverse impact on the environment.

PUBLIC BENEFITS ASSESSMENT:

Knowledge of the effects of cyanide on biota at heap-leach sites is very limited. Therefore, results generated by this project would aid in overall understanding. Project reports would be used mainly by the mining industry and regulatory agencies. The Department of State Lands recommends funding for the project, and the Department of Health and Environmental Sciences submitted favorable reviews. The general public would eventually benefit if project results improve the regulation and reclamation of heap-leach mines.

RECOMMENDATIONS:

A grant of up to $104,391 (does not include indirect costs of $22,867) is recommended contingent on DNRC approval of project scope of work and budget.

APPLICANT NAME: Montana State University, Water Resources Center

PROJECT/ACTIVITY NAME: Mine Water Treatment/Metals Recovery Process

AMOUNT REQUESTED: $115,932

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $14,400

TOTAL PROJECT COST: $130,332

PROJECT DESCRIPTION:

Oxidation and leaching of iron/sulfur-bearing minerals is one of the primary causes of chemical pollution from mining activities. These actions can produce drainage waters that contain high concentrations of sulfuric acid and metals. At present it is necessary to provide physical-chemical treatment of acid mine drainage.

Currently available treatment methods consume significant quantities of chemicals and energy, and most produce effluents that contain high concentrations of dissolved minerals. This research will investigate the feasibility of biocatalyzed demineralization of acidic metal sulfate solutions using the steps of (1) acid phase anaerobic digestion of biomass to produce volatile acids and a stabilized sludge, (2) use of the volatile acids as the carbon source and electron donor for biological sulfate reduction for removal of acidity, metals, and sulfate from acid mine drainage, and to produce acetate, (3) use of the acetate solution as feed for methane phase anaerobic digestion to produce methane and to reduce the organic content of the effluent of the process, and (4) use of the methane to satisfy the energy requirements of the process.

Key to the feasibility of the process is the use of kinetic control (i.e., a relatively short mean cell residence time) to ensure partial oxidation of higher molecular weight volatile acids (e.g., propionic, butyric, valeric) and production of acetate during the sulfate reduction step. In this way, the higher molecular weight volatile acids produced during acid phase anaerobic digestion can be used as electron donors for sulfate reduction (during which they are converted to acetate) and as substrates for the subsequent methane production step.

Research into these processes is ongoing at MSU, and, if the processes are technically and financially feasible, MSU will retain patent rights to the improved process and market it to mining companies.

TECHNICAL ASSESSMENT:

The objective of this proposal is to determine the feasibility of using sulfate-reducing bacteria to clean acid

mine waters through several very complex chemical processes. Acid mine waters would act as the sulfate source for the bacteria. Essential to the process is a carbon source (municipal sludge and produced acetate).

Previous work has clearly established that mixed cultures of sulfate-reducing bacteria can be used to concurrently remove sulfate, acidity, and metal concentrations from acid mine drainage. Several issues remain to be resolved, however, before a process that combines these two concepts can be deemed technically feasible. Those issues are discussed below.

Work to date has used a preformed electron donor such as lactate or acetate to "fuel" the reduction of sulfate. Obviously, such electron donors are too expensive to use in practical treatment systems. Several workers have suggested that biomass be used as the electron donor, and, in fact, sewage sludge has been so used.

One reason biomass has been suggested as an electron donor is that a significant amount of electron donor is needed. Furthermore, sulfate-reducing and methanogenic bacteria are limited in the types of volatile acids they can metabolize. A scheme wherein acetate production would occur during sulfate reduction (i.e., oxidation of higher volatile acids) would be preferred.

Research tasks will address the key issues, especially a separate acid phase digestion of municipal wastewater treatment sludge. Acidogenesis will be used to produce volatile acids that will serve initially as the electron donor for sulfate reduction and then as the substrate for methane production. The heat requirements of the process will be provided, at least in part, by combustion of the methane.

Task 1. Characterize Products of Acid Phase Anaerobic Digestion

Anaerobic acidogenesis of wastewater sludge will be accomplished in the one liter working volume continuous flow stirred tank reactor. The reactor will be seeded with bacteria from an operating municipal anaerobic digester, and combined primary and secondary sludge will be used as feed. Effluent will be analyzed for several constituents known to be utilized as electron donors or growth by sulfate-reducing bacteria.

Task 2. Determine Feasibility of Microbial Sulfate Reduction Using Acid Digester Supernatant as Electron Donor

Sulfate-reducing bacteria will be continuously cultured in a way that will apply selection pressure to the mixed culture. The objectives will be to select against acetate-utilizing bacteria and to select for propionate and butyrate utilizing an acetate-producing bacteria.

The synthetic acid mine drainage will contain the following constituents: ferrous iron, copper, zinc, and sulfuric acid. The feed will be pumped continuously into the reactor with a peristaltic pump. The rate of introduction of the feed mixture to the reactor will be controlled by continuously measuring the pH of the reactor contents and adding acid accordingly. If a sample of water from the Berkeley Pit can be obtained during the

study, a run will be conducted using it as the acid/sulfate source.

Task 3. Determine Feasibility of Microbial Methane Production Using Sulfate Reduction Supernatant as Carbon Source

The feasibility of microbial methane production will be determined in a fluidized bed reactor. The reactor will be seeded with bacteria from an operating municipal anaerobic digester.

Kinetic control will be used in the fluidized bed reactor to reinforce attachment of methanogenic bacteria. This objective will be achieved by operating the reactor at a dilution rate (D) U_{max}. For methanogenesis, a D in the range 0.40 hr^{-1} has been shown to produce 85-90 percent volatile acid removal even in the presence of 160 mg/l of dissolved sulfide. A D of 0.67 hr^{-1} will be used for methanogenesis in this study.

Three different approaches are possible to maximize total volatile acid removal during methanogenesis. The researchers may experiment with all three.

The chemistry of these processes is very complex and will be conducted under controlled laboratory conditions. Reviewers who read the proposal and who were knowledgeable of the chemistry involved support the project.

FINANCIAL ASSESSMENT:

Most of the grant will go toward salaries and benefits, as expected with such labor-intensive research. The principal investigator (1/4 time) and research engineer (1/2 time) account for $15,000 and $25,000, respectively. Two research assistants for one-half year will cost $20,000. MSU will contribute rent, utilities, and indirect costs for a total of $14,400. The rest of the costs are for supplies, equipment, and indirect at 20 percent.

ENVIRONMENTAL ASSESSMENT:

No environmental impacts would result from this research.

PUBLIC BENEFITS ASSESSMENT:

Any economic process that would deal with the problems of mine drainage and recover metals would benefit all Montanans.

RECOMMENDATIONS:

A grant of up to $98,860 (does not include indirect costs of $17,072) is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. In the event financial benefit accrues to the applicant as the result of this process, full or partial repayment of RDGP grant funds is required. The applicant shall promptly notify DNRC of any sale of either the patent rights or the technology/process thereunder.

APPLICANT NAME: Kalispell, City of

PROJECT/ACTIVITY NAME: Lawrence Park Slope Stabilization and Reclamation

AMOUNT REQUESTED: $170,260

OTHER FUNDING SOURCES AND AMOUNTS: Applicant contribution - $25,000
In-kind contribution - $76,100

TOTAL PROJECT COST: $271,360

PROJECT DESCRIPTION:

The city of Kalispell proposes to stabilize a hillside which is continually sloughing. This bank instability threatens a local golf course. The 100-foot tall, nearly vertical bank is considered a hazard to vehicles and pedestrians in Lawrence Park, a city park, as well as those using the golf course situated above the park. Several holes on the golf course are endangered by continued slope movement; approximately 16 feet of the golf course has been lost since 1983.

The vertical hillside was created as the city of Kalispell and city residents removed gravel from the area. This practice was stopped in 1983.

Lawrence Park was originally part of Kalispell's water works. Since 1975 the city and organizations devoted to park improvement have tried to reclaim the park, which has fallen into disrepair.

The unstable hillside would be regraded and stabilized, reducing hazards to park and golf course users. A road in the park would be surfaced, a parking lot constructed, and the graded hillside seeded and mulched.

TECHNICAL ASSESSMENT:

Slope stabilization would be accomplished by cutting and filling to obtain an average grade of 2 to 2.5:1. Cutting back the top of the slope and compacting material at the toe of the slope would be done with crawlers, dozers, and other equipment. This is a straightforward, cost-effective solution to the problem.

The applicant states that about 23,000 yards of gravel to be cut from the top of the slope will be in excess of what is needed at the toe of the slope. However, the cross sections supplied with the application appear to indicate that more fill than cut will be required. New plans will have to be developed to assure that there will be excess fill material when a 2.5:1 slope is attained instead of the 2:1 slope depicted on the cross sections.

Detailed final plans have yet to be developed. Preliminary plans include an interceptor ditch at the top of the regraded slope to funnel water away from the disturbed area and prevent erosion, but do not show where the ditch will drain. Mulching is not discussed in detail. Simple mulching on the regraded slope might be inadequate to prevent erosion. Exact mulching rates and locations are not specified in the application. The proposed seed mixture has not been described. The area to be topsoiled prior to reseeding is not clearly identified.

FINANCIAL ASSESSMENT:

Total projected costs for the project are $271,360, including a 10 percent contingency. A grant of $170,260 is requested. The city of Kalispell will contribute $76,100 in in-kind services, including safety fencing, roadway and parking lot construction, and gravel surfacing of the newly constructed road and parking lot. The city will seed and mulch the reclaimed hillside. Most of the proposed budget will be spent on reclamation and construction of the road and parking lot in Lawrence Park. Only 8 percent of project costs will be spent for professional services and 6 percent on contract administration.

Excess fill material from the project, if any, would be used by the city for road construction. Money for this fill material would be transferred from the city street department to the park department to offset project costs.

Assuming a hydroseeding cost of six cents per square foot and an area of 171,175 square feet, the costs for seeding would be $10,270. The city estimated a cost of $12,100 for both seeding and mulching. The mulching rate being used by the city is unknown.

ENVIRONMENTAL ASSESSMENT:

No significant adverse environmental impacts are expected from this proposal.

PUBLIC BENEFITS ASSESSMENT:

The public would benefit from a safer park and golf course. Adverse impacts caused by unregulated mining would be eliminated.

RECOMMENDATIONS:

A grant of up to $170,260 is recommended for this project contingent on:

1. DNRC must approve the project scope of work and budget.
2. Assurances must be obtained that the city will contribute $25,000 whether or not there is excess gravel from the project.

APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Mine Subsidence Reclamation Project

AMOUNT REQUESTED: $170,000

OTHER FUNDING SOURCES AND AMOUNTS: Butte-Silver Bow - $2,300
Urban Revitalization Agency - $150,000

TOTAL PROJECT COST: $322,300

PROJECT DESCRIPTION:

The applicant proposes to extend the Emma Mine Site Park one block northward. The area is in a mine subsidence zone located about two blocks west of Butte High School. Improvements include removal of dilapidated structures, grading, topsoiling, installation of an irrigation system, revegetation, purchase of park equipment, and provision of sidewalks and curbs. The total number of lots affected is eighteen, thirteen of which are vacant and covered with weeds and debris. Butte-Silver Bow proposes to acquire these lots through its tax increment financing program at an estimated cost of $150,000.

The extension of the Emma Mine Site Park is a long-term goal of the Urban Revitalization Agency (URA). The URA believes it will be necessary to perform major clean-up of the areas bordering the Central Business District if the district is to remain viable. The project is integral to the URA's plans to mitigate the adverse impacts of past mining and resultant urban blight.

TECHNICAL ASSESSMENT:

The proposal is straightforward and presents little difficulty in implementing. Butte-Silver Bow will perform most of the construction. Work it is unable to perform will be competitively bid. Opinions on the final design will be solicited from the area residents, school district, Parks and Recreation Board, URA, Butte-Silver Bow Council of Commissioners, legislative delegates, and the state.

FINANCIAL ASSESSMENT:

The budget estimates are similar to the already existing Emma Mine Site Park costs if the acquisition and demolition costs are subtracted from the total. Labor and benefits are $63,355, administrative costs are approximately $6,000, and supplies and materials for construction make up the remainder of the proposed total budget of $322,300.

The Urban Revitalization Agency will obtain funds to acquire the properties. The $150,000 contribution is a rough estimate of

the costs. Butte-Silver Bow will contribute $2,300 for communications, rent, and utilities.

ENVIRONMENTAL ASSESSMENT:

The short-term adverse impacts would be those typical of construction projects, including increased noise and dust. These effects will be minimized by the short duration of this project. Another adverse impact would be the demolition of the five buildings. Because the area is in the Historic District, the State Historic Preservation Office will be consulted prior to demolition. Butte-Silver Bow has consulted the local Historic Preservation Office, and the preliminary view is that there will be no significant adverse impacts because of the character of the buildings and their condition.

Since this project will result in the expansion of a city park, the major beneficial impact will be on recreational opportunities for the local neighborhood. The aesthetics will also improve through the removal of deteriorated buildings and the planting of grasses, shrubs, and trees. No long-term adverse impacts are anticipated.

PUBLIC BENEFITS ASSESSMENT:

The project will help mitigate the urban blight in central Butte that has occurred as a direct result of the effects of mining-related subsidence in the area. The creation of a central park encompassing two blocks will reverse some of the deterioration and act as an impetus for other improvements.

The dilapidated buildings on the block pose a safety and fire hazard to the area. The demolition of the buildings and removal of debris will eliminate these hazards.

In addition, the construction of the park and removal of the blighting influences will benefit the economic development of the Central Business District and promote a healthier, more vital community.

RECOMMENDATIONS:

A grant of up to $170,000 is recommended contingent on:

1. DNRC must approve the project scope of work and budget
2. Butte-Silver Bow must acquire deeds to the properties before design or construction activities commence
3. Butte-Silver Bow must provide further documentation that no liable party exists who can reasonably be expected to be held responsible for the subsidence-related problems
4. The Montana Department of Health and Environmental Sciences and the Environmental Protection Agency must confirm that this project will not conflict with Superfund activities

APPLICANT NAME: Montana State University, Department of Plant and Soils Science

PROJECT/ACTIVITY NAME: Predicting Movement of Pesticides Through Montana Soils to Groundwater: An On-farm Management Tool

AMOUNT REQUESTED: $98,788

OTHER FUNDING SOURCES AND AMOUNTS: Department of Plant and Soils Science - $59,818

TOTAL PROJECT COST: $158,606

PROJECT DESCRIPTION:

The applicant proposes to develop a pesticide management tool which would classify and map croplands according to their pesticide-leaching potential. The classification would be based on existing solute transport models integrating site-specific soils, climate, and hydrology data and pesticide properties. The management tool will be demonstrated at two representative farm sites in agricultural counties. Results of the modeling approach and demonstration field days will be published to educate pesticide users about the possibilities for site-specific application, efficient pesticide use, and groundwater protection. The objective of the project is to provide farmers, cooperative extension personnel, state agency personnel, and the general public with a means to evaluate the potential of an agricultural chemical to contaminate groundwater.

TECHNICAL ASSESSMENT:

The problem, as stated in the proposal, is the threat to groundwater quality posed by the leaching of agricultural pesticides. Although the project will not solve groundwater quality problems directly, it will educate pesticide users and contribute to groundwater protection in Montana.

The proposal does not describe how the reliability of the model will be evaluated. It states that demonstration sites will be ground checked, but does not describe any pesticide analysis of soil or soil water samples. The proposal does state that the contamination prediction categories used in the demonstrations will be correlated with the results of more detailed studies around the state.

The strength of the project lies in its emphasis on creating public awareness of the pesticide contamination problem. The project should enable a concerned pesticide user to obtain a map that will identify contamination risk areas based on the best available information.

FINANCIAL ASSESSMENT:

The budget categories are clearly defined. Wages and salaries costs ($53,000) are reasonable for the personnel involved and the employment durations. Supplies and materials costs ($3,800) are adequately explained and reasonable.

Indirect costs are calculated as 20 percent of direct costs and do not include the use of university equipment. An additional miscellaneous cost of $3,000 is requested for computer services. However, it would be reasonable for the applicant instead to include computer use costs in the 20 percent multiplier, because $4,000 of DNRC funds are requested for purchase of computer equipment. DNRC funds are covering the larger share of purchase costs for a computer that will long outlive the project.

ENVIRONMENTAL ASSESSMENT:

The project will not have any adverse environmental impacts.

PUBLIC BENEFITS ASSESSMENT:

Important public benefits of the project are increased public awareness of the pesticide contamination problem, progress toward groundwater protection in Montana, and the integration of site-specific data into a pesticide transport model. The mapping product of the project will enable Montana pesticide users to assess the probability of groundwater contamination from their cropland. Use of the model will improve the utility of current pesticide-leaching research in Montana.

RECOMMENDATION:

A grant of up to $82,990 (does not include indirect costs of $15,798) is recommended for this project contingent upon a commitment of $59,818 by Montana State University.

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APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Mitigation of Mining and Smelting Damage Through Urban Forestry

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: Butte-Silver Bow
Friends of the Urban Forest - $51,000

TOTAL PROJECT COST: $351,000

PROJECT DESCRIPTION:

Butte-Silver Bow's highest priority is to diversify and expand its economy. However, urban blight due to past mining has

been documented as one of the major barriers to economic development. Federal, state, and local reports have concluded that an aggressive Urban Forestry Program would be an important part of urban enhancement for Butte. Butte-Silver Bow proposes to implement an Urban Forestry Program as part of a total Urban Enhancement Program which will be locally directed and controlled, and, in the near future, self-sustaining. The project will be administered by Butte-Silver Bow through its Park and Recreation Department in cooperation with a nonprofit organization--Butte-Silver Bow Friends of the Urban Forest.

The project includes three phases. The first phase would be the establishment of a tree-growing site in an area adjacent to the county shops. The second phase would be the implementation of neighborhood tree-planting projects. The third phase would involve securing greenhouse space at the National Center for Appropriate Technology (NCAT) to grow trees from seeds collected from the successfully established trees in Butte.

TECHNICAL ASSESSMENT:

The project appears technically feasible. The project requires substantial community involvement and commitment to succeed. However, Butte appears to have been very successful at planning and selling the idea to the local community. If the interest is maintained, the project could provide, as a final product, a self-sustaining Urban Forestry Program.

This project continues work approved for funding by the 1987 legislature. The previously approved project was only partially funded, which reduced the scope of work. If the funded portion of the project is successful, Butte-Silver Bow would like to expand the current efforts to the originally proposed scope of work. The proposed additional funding would be used to continue tree-planting efforts in the Butte area.

FINANCIAL ASSESSMENT:

This project was approved for RDGP funding at a reduced level of $100,000 in 1987. The budget in the present proposal is basically the same as the budget in the original request for funding. The only exception is that wages for an urban forester have not been included in the current proposal. The budget for RDGP funds includes $15,982 for administrative expenses, $215,320 for tree-planting activities, $47,142 for nursery development, and $21,556 for contingencies. The labor and equipment rates used are the prevailing local rates. The suggested tree costs are reasonable.

Landowners will be asked to purchase the trees for $50 each, which will supplement project funds. And, the Butte-Silver Bow Friends of the Urban Forest will donate $51,000 for salaries, supplies, and materials.

ENVIRONMENTAL ASSESSMENT:

This project should not cause any significant adverse environmental impacts. The major beneficial impacts would be improved urban forests and aesthetics in the Butte community. The trees could reduce street dust and air pollution. Reduced

noise and erosion will also result. The increase in trees along Butte streets could provide habitat for birds and urban wildlife.

PUBLIC BENEFITS ASSESSMENT:

This project will mainly benefit Butte residents. Street trees should enhance the community's appearance and decrease noise and dust pollution. The efforts will help reduce urban blight and may, therefore, improve chances for economic development activities in the Butte area.

RECOMMENDATIONS:

A grant of up to $200,000 is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. Tree planting in areas of Butte where the absence of trees and vegetation is most evident will be given priority.
3. Guidelines that are developed by an urban forester will be used, rather than hiring a full-time urban forester.
4. Butte-Silver Bow must implement soil testing and plant site evaluation procedures approved by EPA and DHES to deal with mining wastes that may be encountered in this project.
5. Phase three (greenhouse) is not included in this recommendation and shall be deleted from the project.

If the 1987 funding is available, this grant will be reduced to $100,000.

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APPLICANT NAME: Deer Lodge Valley/Mile High Conservation Districts (Co-applicants)

PROJECT/ACTIVITY NAME: Restoration of Agricultural Productivity in Lands Affected by Mine Waste Pollution in the Clark Fork Basin

AMOUNT REQUESTED: $221,912

OTHER FUNDING SOURCES AND AMOUNTS: Soil Conservation Service - $17,000
Headwater RC&D - $14,500
Landowners - $8,000

TOTAL PROJECT COST: $261,412

PROJECT DESCRIPTION:

This project is a field-scale test of cost-effective

techniques for re-establishment of forage production on agricultural land contaminated by wastes. This is the third phase of a research project begun in 1984 using state funds.

Methods for reclaiming soils and establishing forage grasses on agricultural areas contaminated by mining wastes were developed under a previous RDGP project. The methods, which were developed in small-plot experiments, indicate that significant forage yields can be achieved on reclaimed soils and that metal levels in forage will not harm livestock. Under the proposed project, these techniques will be implemented at a field scale to (1) adapt reclamation methods to normal farm machinery, (2) identify typical reclamation costs, (3) demonstrate the results possible, (4) identify land areas that could be reclaimed using the techniques, and (5) develop a cost-share program to encourage local landowners to participate in a clean-up program.

TECHNICAL ASSESSMENT:

The Anaconda-Deer Lodge area has been contaminated with mining wastes and irrigation water from the Clark Fork River. Because of this contamination, forage production has been dramatically reduced. In some areas nothing will grow. The first stage of the study is to inventory agricultural lands impacted by mining waste and quantify the severity of impact in specific areas.

The methods under study--liming with the addition of manure and phosphorous--will be applied at rates commensurate with levels of contamination at six sites, each 10 to 15 acres in size. These sites are located in the Deer Lodge Valley near Warm Springs. Reviewers have suggested a reduction in sample size to four sites.

The study will provide useful information on the amount of forage produced, the quality of the forage, the cost and practicality of implementing forage establishment techniques on a field scale, and the long-term survival of forage systems under typical management. Significant benefits would accrue to local farmers and ranchers if the methods prove cost-effective. Development of a model cost-share assistance program formulated in this project may be necessary.

FINANCIAL ASSESSMENT:

This is primarily a research project with attendant costs for sampling, final experimental design, and testing. Actual costs for addition of soil amendments and seeding are estimated to be about $541 per acre without deep incorporation of amendments.

The project will be administered by Headwaters RC&D and the Soil Conservation Service. Administrative costs paid by the grant amount to 8 percent of the total project costs. Landowners will contribute in-kind services, including seeding and tilling on the test plots. Contracted services account for 39 percent of the project total. While some of the estimated labor costs seem high, putting these services out for competitive bids should resolve any problem.

ENVIRONMENTAL ASSESSMENT:

No significant long-term impacts are anticipated. Short-term increases in dust are possible during tillage.

PUBLIC BENEFITS ASSESSMENT:

Reclamation of agricultural lands will have both private and public benefits. Improvement of forage production will decrease wind and water erosion from these areas, thus improving both air and water quality. Reduction in runoff of metal-laden sediments into surface water may help improve the water quality of the Clark Fork, thus improving the fishing resource.

Other benefits include mitigation of damage to agricultural lands due to mining activity, improvement in farm income, improved utilization of soil and water for crop and livestock production, and reduction in exposure to dust from impacted soils. The results of the project will be used by local farmers and ranchers to reclaim mining-impacted lands. Techniques developed through this project may be applicable to other mining-impacted areas in Montana.

RECOMMENDATIONS:

A grant of up to $189,401 is recommended. The reduced level reflects a decrease in the number of acres to be treated from 90 acres to 40 acres (four sites of 10 acres each), fertilizer costs, and labor. DNRC must approve the project scope of work and budget. Additionally, coordination and approval from EPA and DHES are required. All contracted services shall be competitively bid.

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APPLICANT NAME: Upper Musselshell Conservation District

PROJECT/ACTIVITY NAME: Musselshell River Stream Corridor Project

AMOUNT REQUESTED: $126,144.50

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $19,038.00

TOTAL PROJECT COST: $145,182.50

PROJECT DESCRIPTION:

The Musselshell River Stream Corridor Project was developed to provide a systematic plan of action for treating streambank erosion problems on the Musselshell River. Construction in 1908 and subsequent maintenance of the Milwaukee Railroad right-of-way have caused extensive channel modification (channelization, channel cut-offs, straightening, etc.), leading to widespread channel erosion and degradation of water quality and wildlife habitat. Agricultural developments (farming and grazing) have further reduced streambank stability. Before abandonment of the

railroad, frequent maintenance was performed on the numerous pressure points to control the erosive forces and prevent breaching of the right-of-way. Now that the Milwaukee Railroad is no longer maintaining the roadway, the responsibility for protecting these many pressure points lies with the persons owning the land. Although left to cope with the problems created, landowners are limited both financially and technically in channel maintenance and restoration efforts.

The Musselshell River Stream Corridor Project will demonstrate environmentally sound stream channel stabilization measures at ten problem sites located between Harlowton and Roundup, Montana. Stabilization measures and riparian zone management that encourage healthy bank vegetation are emphasized. Public education will be accomplished through site tours and public meetings.

TECHNICAL ASSESSMENT:

Streambank instability and channel erosion are well-documented problems on the Musselshell River. The principal cause is channel shortening (straightening) that has increased stream gradient and the erosive power of streamflow. When channel shortening is coupled with agricultural practices that remove riparian vegetation (a proven cause of streambank erosion), the result is significantly accelerated channel erosion.

Structural bank protection measures (riprap and other revetment) are prohibitively expensive and, if used widely, may cause secondary impacts. This project will attempt to demonstrate bank stabilization through the use of vegetation management (fencing the riparian zone), bank protection with cabled-tree revetment, and rock and log drop structures to reduce channel gradients. If properly designed and implemented, these measures should markedly improve bank stability at the ten demonstration sites. Reviewers (DHES, DFWP, EPA) were unanimous in their support and approval of the project.

By itself this project will not result in widespread improvement in channel stability; to achieve that result, subsequent landowner cooperation and follow-up implementation are required. The public education and monitoring components of the project are not well defined. There is some risk of project failure should peak flows exceed the flows selected as channel protection measures are designed.

FINANCIAL ASSESSMENT:

The total project budget is estimated at $145,182.50 with $19,038 contributed by the applicant. Project costs include personnel, $36,550 (project director, education coordinator, secretary); contracted services, $59,924.20 (contractor, engineer); materials, $34,682.80 (construction and educational materials); and associated costs $14,025.50 (fringe benefits, phone, travel, rent, utilities, video equipment, miscellaneous costs). Estimated costs appear reasonable.

ENVIRONMENTAL ASSESSMENT:

This project will have a short-term adverse effect on water quality (turbidity and suspended sediment) due to the necessity for in-channel work. Over the long term, streambank stabilization has the potential for reducing sediment loads and improving aquatic habitat. Short-term impacts can be reduced by conducting in-channel work during periods of low flow.

PUBLIC BENEFITS ASSESSMENT:

This project will demonstrate the use of streambank stabilization measures and educate landowners on proper riparian zone management. If successful, this project will encourage widespread landowner participation and application of these measures. This will eventually lead to reduced sediment loads and improved water quality and wildlife habitat.

RECOMMENDATIONS:

A grant of up to $126,145 is recommended for this project, contingent on:

1. DNRC must approve the project scope of work, budget, and site-specific demonstration project designs.
2. The Upper Musselshell Conservation District must demonstrate that the Milwaukee Railroad is not a liable party who can reasonably be expected to be held responsible.
3. If federal Section 319 matching funds for the project become available from EPA, then RDGP funds shall be reduced accordingly.
4. The applicant must develop a rigorous monitoring plan for assessing the project's effectiveness.

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APPLICANT NAME: Whitefish County Water and Sewer District

PROJECT/ACTIVITY NAME: Swift Creek Clay Banks-Pilot Project

AMOUNT REQUESTED: $73,440

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $4,055

TOTAL PROJECT COST: $77,495

PROJECT DESCRIPTION:

Whitefish Lake is a valuable recreational resource and an important part of the local economy. However, excessive erosion of clay banks along Swift Creek contributes large amounts of fine sediment to Whitefish Lake. In addition to the problems of turbid water and accelerated sedimentation rates, phosphorous associated with the sediments contributes to the lake's nutrient

load, which is alarmingly high. Elevated levels of phosphorous stimulate algae growth, reduce dissolved oxygen levels needed for fish, and accelerate the process of eutrophication.

Under this proposal a variety of remedial erosion control measures would be applied on three demonstration sites to test their effectiveness in stabilizing eroding banks. It is intended as a pilot project for a larger scale future effort to stabilize as many as 40 sites along the lower ten miles of Swift Creek. This project would not directly result in a significant overall reduction of sediment and phosphorous loading to Whitefish Lake; however, if successful erosion control methods can be developed, future widespread application could reduce the lake's sediment load by 65 percent and phosphorous load by 25 percent, according to applicant's estimate.

TECHNICAL ASSESSMENT:

Several studies have identified nutrient loading as a significant water quality problem in Whitefish Lake. A 1977 study by the EPA credited Swift Creek with contributing 70.6 percent of the total phosphorous load of the lake. A detailed study by Golnar and Stanford (1984) found that Swift Creek supplied 53 percent of the lake's total annual phosphorous load and predicted that serious eutrophication problems would result if phosphorous inputs increase in the future.

Soluble phosphorous is more biochemically available for plant growth than non-soluble forms and is of greatest importance in evaluating the trophic status of lakes. The amount of biologically available phosphorous associated with Swift Creek sediments entering the lake is unclear. The difference between Swift Creek's total annual phosphorous input (2,490Kg) and soluble phosphorous input (564Kg) gives an estimate of sediment or particulate phosphorous (1,926Kg). Generally, on an average annual basis, 10 percent or less of sediment phosphorous is biologically available in the Flathead basin. Reduction of sediment inputs from Swift Creek would affect only this fraction of biologically available phosphorous and would not significantly reduce soluble phosphorous inputs. However, based on available information a 100 percent reduction in sediment yield from Swift Creek clay banks could result in a 10 percent reduction in the biologically available phosphorous of Whitefish Lake.

The applicant proposes to test a variety of erosion control methods on three sites (eroding clay banks) to determine which measures are most effective. A fourth site with no erosion treatment will be used as a control. With the exception of using tire-blankets as bank armor, the proposed erosion control methods are standard and include backsloping and terracing of banks, revegetation, bank armor, and flow deflectors. Site-specific designs are not given in the application. Monitoring of erosion processes and vegetation growth at study sites is planned, but the monitoring plan is not well defined. Results of this project are intended to be used in developing a comprehensive project to stabilize as many as 40 eroding banks in the lower ten-mile segment of Swift Creek.

Reviewers were generally supportive of the project but expressed a number of concerns. The suitability of using old tires as bank protection was questioned. Several reviewers indicated that forest practices in the Swift Creek drainage may have increased water yields (peak flows), thereby contributing to bank erosion problems as well as phosphorous loading. This proposal does not address the extent to which forest practices affect channel erosion processes or phosphorous loading.

The proposed project evaluation period of one year (post-construction) is inadequate. Physical performance of stream channel modifications should be monitored over an extended period of time (five years or greater). To a large extent, the appropriate duration of monitoring depends on post-implementation climate and the flow-regime experienced by the project. The monitoring period must include peak flows of sufficient magnitude to adequately test the design.

This project by itself would not result in a significant reduction of phosphorous loading in Whitefish Lake. The successful application of erosion control methods developed by this project to other eroding clay banks could result in, at most, a 10 percent reduction in inputs of biologically available phosphorous and a higher reduction of the lake's sediment load. These reductions are considered very significant given the borderline trophic status of Whitefish Lake.

FINANCIAL ASSESSMENT:

This project appears feasible with the requested funds. An additional commitment of funds is probably necessary to ensure adequate project monitoring and evaluation.

The total project cost is $77,495. Funding sources include $4,055 from the applicant. In addition $11,500 is being sought from the EPA Solid Waste Division to test the use of tire-blanket revetment. (The expanded long-range project envisioned for the entire lower ten miles of Swift Creek is presently a candidate for Section 319, EPA nonpoint source funds.) Availability of EPA funds is uncertain at this time.

The budget breakdown includes: personnel services, $32,678 (administrator, engineer, inspector, technicians, labor, and fringe benefits); contracted services, $2,740 (lab costs, printing); supplies and materials, $13,072; communication, $600; travel, $745; rent and utilities, $2,400; equipment, $16,425; and contingency, $8,835.

ENVIRONMENTAL ASSESSMENT:

Water quality may be temporarily degraded during the construction phase. Activities involving streambed disruption will be confined to non-spawning months of July and August. Revegetation and stabilization of eroding banks over the long term will result in improved water quality.

PUBLIC BENEFITS ASSESSMENT:

The demonstration project itself will not substantially improve water quality or aquatic habitat or reduce phosphorous loading to Whitefish Lake. The future successful application of

erosion control methods, developed by this project, to other problem areas and Swift Creek could significantly improve water quality and aquatic habitat and reduce phosphorous loading. Achievement of this long-range goal would prolong the recreational and economic value of Whitefish Lake.

RECOMMENDATION:

A grant of up to $73,955 is recommended for this project (including $5,000 for monitoring), contingent on:

1. DNRC must approve a detailed scope of work and budget.
2. The applicant must develop and DNRC approve a five-year monitoring plan to evaluate performance of the erosion control measures.

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APPLICANT NAME: Natural Resources and Conservation, Department of, Conservation Districts Division

PROJECT/ACTIVITY NAME: An Accelerated Soil Survey Program for Montana

AMOUNT REQUESTED: $298,018.80

OTHER FUNDING SOURCES AND AMOUNTS: Conservation Districts - $14,400.00
Soil Conservation Service - $124,643.00

TOTAL PROJECT COST: $437,061.80

PROJECT DESCRIPTION:

The purpose of the proposal is to train, equip, and provide administrative support for six soil scientists who will be working with the Soil Conservation Service (SCS) to accelerate the soil survey program by mapping an additional 600,000 acres in Montana. The six soil scientists will be working as conservation district employees. Each person will be assigned to a separate district based on mapping needs as determined by the Conservation Districts Division and the SCS at the time of the award. The selected conservation districts (CDs) will advertise and fill the positions with persons meeting the minimum civil service requirements for soil scientists. The CDs will secure leases on six pick-up trucks (one for each employee) and provide clerical assistance for the two-year term of the program. The SCS will provide field and office equipment, administrative support, and five weeks of field training.

TECHNICAL ASSESSMENT:

The project goal of 600,000 mapped acres was derived from mapping rates for beginning soil scientists estimated from past SCS experience. The long history of SCS involvement in soil mapping enables the agency to develop accurate estimates.

No detailed technical data were presented to document need and urgency for the proposal or to allow an assessment of alternatives. Potential uses and users of published soil survey information were listed as a means to express need. Deadlines imposed by the Food Security Act, however, and the agricultural income that could potentially be obtained with compliance could satisfy a crucial state need for an accelerated soil survey.

FINANCIAL ASSESSMENT:

Most of the budget categories appear to be adequately funded. If the district employees are working with established SCS mapping crews, transportation should be available without providing each person with his or her own leased vehicle. Eliminating this budget item would cut equipment costs by more than 50 percent.

ENVIRONMENTAL ASSESSMENT:

The proposed project should have no adverse environmental impacts.

PUBLIC BENEFITS ASSESSMENT:

Public benefits will most likely be realized by progress toward completing cropland soil mapping by December 31, 1989. This mapping is a high priority because of the 1985 Food Security Act. Soil erodibility ratings and conservation plans required by the act depend on timely soil mapping and could possibly represent large farm program incomes in some communities. The project will also contribute six well-trained soil scientists to Montana agriculture and speed the publication of valuable soil survey information.

RECOMMENDATION:

Because of the deadlines imposed by the Food Security Act and the potentially large value of associated farm program income, an accelerated soil survey program meets a crucial need in Montana. A grant of up to $264,418 is recommended, contingent on:

1. DNRC must approve project scope of work and budget.
2. Matching funds in the amount of $139,043 must be available.

APPLICANT NAME: Montana College of Mineral Science and Technology

PROJECT/ACTIVITY NAME: Computer Model for and the Experimental Application of the Treatment of Berkeley Pit Acid Water

AMOUNT REQUESTED: $26,596

OTHER FUNDING SOURCES AND AMOUNT: Montana College of Mineral Science and Technology - $3,674
Montana Resources, Inc. - $1,579

TOTAL PROJECT COST: $31,849

PROJECT DESCRIPTION:

Of all the potential acid mine abatement processes, lime/limestone addition is the most frequent choice. Presently, no efficient method exists to quantify the volume of lime/limestone addition required for the abatement of acid mine water. The current state of the art generally requires specific experimentation (batching) with the acid water to be treated and the materials available for treatment. The current method does not allow for essential changes to the selected process due to changes in flow or concentration during the abatement phases.

The applicant proposes to modify an existing equilibrium speciation computer program (REDEQL) so that it will accurately predict the result of an acid mine abatement process of lime/limestone addition. The applicant believes that this program could potentially be used to assess the economic, physical, and chemical efficiency of abatement processes at a variety of acid mine sites in Montana.

To address the limitations of REDEQL, additional experimentation with the lime/limestone addition process is required. For this experiment, the applicant proposes to use Berkeley Pit acid water and basic reagents from the cement plants at Montana City and Trident, plus mill tailings from the Montana Resources, Inc., (MRI) concentrator. The intent here is to illustrate the efficiency of using two industrial waste products to treat the Berkeley Pit acid water. Based on the results of this experimentation and the associated analysis, the applicant will modify the existing computer model by addressing its basic limitations.

TECHNICAL ASSESSMENT:

The applicant has attempted to modify the REDEQL equilibrium speciation computer program to predict the result of an acid water abatement process in the past. That effort resulted in the

accurate prediction of precipitated phase identities, but inaccurate quantities. The inability to predict activity coefficients for solutions having the high ionic strength of acid mine water, the lack of data to allow the prediction of metal adsorption, the omission of the solubility products for the appropriate solid phases, and the assumption of equilibrium conditions have been identified by the applicant as the most likely limitations to the REDEQL model and other existing computer models.

To address these issues, the applicant intends to perform a detailed physical and chemical characterization of the acid water from Berkeley Pit and the basic phases to be added (cement plant limestone dust and MRI concentrator mill tailings). These phases will then be mixed in the appropriate ratios and the resulting heterogeneous mixture characterized. The concentration of dissolved species will be determined, the identity and amounts of precipitated solid phases determined, and the degree of ion adsorption established. Based on the results of this experimentation, the existing computer model will be modified to address the previous limitations.

The use of the Davies equation to predict activity coefficients could present a considerable challenge should the ionic strength of the acid water to be treated exceed certain parameters (approximately 35,000 TDS). Exceeding these parameters would invalidate current data and analytical methods, and solving the problem would become time-consuming and expensive. However, every indication is that, for the ionic strength of the Berkeley Pit water, the Davies equation is valid. Describing and quantifying metal adsorption associated with the proposed process will be difficult, but possible. In addition, using water samples collected at a depth of one foot is questionable, given the significant difference in the water chemistry at greater depths.

While the above issues point out the difficulties and risks associated with the proposed project, there is nothing that suggests it cannot be successfully completed. Reviewers are generally supportive of the experimentation and the need for the resulting data.

It is important to keep this project in perspective as it relates to the Berkeley Pit problem. This project, if completely successful, will establish the technical feasibility of using the proposed reagents to neutralize the Berkeley Pit water and provide a tool for quantifying the volume of reagents needed on a continuous basis. It does not address the process equipment required, the cost of this equipment, the cost of purchasing and transporting the required reagents, etc. In short, it does not establish the economic feasibility of the proposed abatement process.

FINANCIAL ASSESSMENT:

The total project cost of $31,849 is distributed as follows: principal investigator - $13,470 (42 percent); graduate student - $7,500 (24 percent); undergraduate student - $1,579 (5 percent); supplies and materials - $5,000 (16 percent); rent,

travel, and miscellaneous - $4,300 (13 percent). The project budget is adequately documented, and project costs are acceptable.

ENVIRONMENTAL ASSESSMENT:

The proposed project is a study effort that will have no adverse environmental impact. If the project is successful, it will provide for more accurate control of acid mine water abatement processes and, therefore, reduce the frequency of accidental water quality discharge violations.

PUBLIC BENEFIT ASSESSMENT:

Currently, Berkeley Pit is filling with heavy-metal-laden water that will eventually overflow into the Butte area hydrologic system and the headwaters of the Clark Fork River. This event will result in much environmental damage and pose a health hazard. The proposed project, if successful, has the potential to be part of the solution to this problem.

The mineral industry generates large quantities of acid and metal-laden aqueous solutions that require treatment prior to discharge into streams, rivers, and lakes. The present method of treatment does not allow for changes in process system flows and concentrations, which results in overapplication or underapplication of basic reagents (lime/limestone). Overapplications are expensive to the industry, and underapplications result in discharge violations and water quality degradation. This project could potentially improve the present treatment methods to eliminate this problem.

RECOMMENDATION:

A grant of up to $24,963 (does not include indirect costs of $1,633) is recommended contingent on:

1. DNRC must approve the project scope of work and budget.
2. The project sponsor must coordinate project activities with the EPA to ensure that the proposed effort does not conflict with Superfund activities.

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APPLICANT NAME: University of Montana, School of Forestry

PROJECT/ACTIVITY NAME: Mapping Saline Seep with LANDSAT Thematic Mapper Data

AMOUNT REQUESTED: $22,780

OTHER FUNDING SOURCES AND AMOUNTS: Montana Salinity Control Association - $1,000

TOTAL PROJECT COST: $23,780

PROJECT DESCRIPTION:

A single LANDSAT thematic mapper (TM) scene covering 75 square miles will be obtained for an area covering the Triangle Conservation District. Thirty saline seep areas will be located within the study area. Soil and vegetation data collected at each site will include soil moisture and electrical conductivity readings, plant species recordings, and plant growth stage. Field data will be collected during the growing season between June 23 and July 7, and will coincide with the TM coverage.

Field sampling sites will be located on the satellite imagery, and reflectance data from mature seep areas will be recorded to develop a characteristic salinity signature. The possibility of developing signatures for various stages of saline seep will also be investigated. Once signatures are developed, the entire scene will be classified. The classification will be verified by observation of actual conditions on the ground or "ground truthing." County boundaries within the Triangle Conservation District will be digitized, and the saline area within each county will be computed. Each county will receive the mapped results of the project.

The objective of the project is to demonstrate that saline seep mapping based on LANDSAT TM data is accurate and cost-effective.

TECHNICAL ASSESSMENT:

The proposal defines saline seep as the problem. The project itself will not directly solve the problem but will test the effectiveness of an inventory and monitoring tool. The general outline of the work statement includes the necessary steps for testing the benefits of satellite data for mapping. Technical points, however, raise questions about the project's feasibility. Thematic mapper data are available in seven wavelength bands. Bands 1 through 5 and band 7 have a resolution of 30m. The thermal band 6, however, has a resolution of 120m. The applicant cites the advantages of the high resolution (30m) of TM data and the importance of the thermal wavelength band. The smallest area that the thermal band of TM can delineate is 3.5 acres. The thermal bank alone would not be useful in detecting smaller seep areas. The applicant does not present sufficient detail about how the bands will be used to allow a thorough technical assessment.

The proposal presents thorough documentation of the savings in time and dollars that would be realized by using LANDSAT data to inventory and monitor Montana's saline seep problem. The investigators plan to use existing soil and vegetation data resourcefully to reduce field time and data collection costs. The quality of the mapping product will be compared with photo interpretive methods to check accuracy.

FINANCIAL ASSESSMENT:

The budget appears well developed and reasonable. The travel cost for field visits ($1,200) seems low, but may reflect the project's use of existing field data.

ENVIRONMENTAL ASSESSMENT:

No adverse environmental impacts will result from the project.

PUBLIC BENEFITS ASSESSMENT:

Public awareness and support of salinity control in Montana have been made evident by the establishment of the Montana Salinity Control Association and three salinity control districts across the state. Written support for the project has been received from Montana State University. Development of a rapid and relatively inexpensive mapping technique would benefit the public by identifying potential crop income losses and monitoring successful reclamation efforts.

RECOMMENDATION:

A grant of up to $18,983 (does not include indirect costs of $3,797) is recommended for this project contingent upon DNRC approval of project scope of work and budget.

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APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Buffalo and Missoula Gulch Mine Reclamation Erosion Control

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: Butte-Silver Bow - $1,700
Atlantic Richfield Company - $77,100

TOTAL PROJECT COST: $378,800

PROJECT DESCRIPTION:

This project is proposed to address problems associated with surface drainage and erosion on properties surrounding mined areas in Buffalo and Missoula gulches.

A 1984 report by the Department of State Lands stated that the Buffalo and Missoula gulch storm drains contribute to the degradation of Silver Bow Creek. Additionally, the mine waste materials that enter the storm drainage system will lead to its premature failure.

This project will correct the identified problems by:

1. Obtaining an agreement with Atlantic Richfield Company to clean up mine wastes on properties surrounding the storm drainage system, which will substantially reduce the mine waste loading on the system

2. Designing and installing a storm drain system that will reduce the quantity of heavy metals entering the system and will effectively transport the surface water in the area.

TECHNICAL ASSESSMENT:

The project will be completed in two phases: (1) the preparation of preliminary and final plans and specifications, and (2) the construction.

The Atlantic Richfield Company will coordinate its reclamation work on the adjacent properties with Butte-Silver Bow to ensure that reclamation is completed before the storm drain construction.

A professional engineer will be required for the storm drain system design, specifications, and construction supervision. The preliminary plan for the storm drain system includes:

1. Construction of 1,000 feet of open ditches using riprap and filter fabric
2. Construction of detention ponds
3. Installation of 5,000 feet of 18"-36" reinforced concrete pipe
4. Installation of catch basins to collect surface water

According to the Drainage and Erosion Control Study of Uptown Butte by Thomas Dean and Hoskins, Inc., the major problem with the existing storm drainage system is the clogging of inlets from sedimentation and debris. This project should address this problem.

With regard to the liable party, Butte-Silver Bow is the owner of the storm and erosion control systems. It is responsible for all maintenance and upgrading of the system. The Butte Hill area is a Superfund site, and the Atlantic Richfield Company has been identified as the primary responsible party for reclamation of the adjacent mine properties. This project should complement the reclamation efforts.

FINANCIAL ASSESSMENT:

The budget for this project is similar to the budget for the Walkerville storm drain project currently funded by the RDGP. Most expenses are for engineering, materials, and labor under contracted services. Material costs are comparable to those of the Walkerville project.

ENVIRONMENTAL ASSESSMENT:

The project should have a positive, beneficial effect on the quality of water in Silver Bow Creek. At present, the surface water in the Buffalo and Missoula gulch areas flows over mine waste materials and carries the contaminants to the Butte-Silver Bow storm drain system and eventually to Silver Bow Creek. This project will control surface water runoff, prevent large volumes of surface water from flowing over mine wastes, and therefore improve the quality of water entering Silver Bow Creek.

Reclamation of the unvegetated areas will help stabilize the drainages and reduce further soil erosion.

PUBLIC BENEFITS ASSESSMENT:

The reclamation work that Atlantic Richfield Company will perform in conjunction with Butte-Silver Bow's construction of an effective storm drainage system will mitigate the environmental damage caused by the mine waste materials and resultant erosion in the area. It will also eliminate one of the sources of heavy metal contamination of Silver Bow Creek; because Silver Bow Creek is a tributary to the Clark Fork River, residents elsewhere in the state, as well as those in Butte-Silver Bow, will benefit.

The completed project will prevent further flooding of residential properties. When this benefit is combined with the overall positive aesthetic effect on the area, the project should serve to increase the value of area property.

The removal of urban blight from any area of the community has a positive effect on the community as a whole and on economic development efforts.

RECOMMENDATIONS:

A grant of up to $300,000 is recommended contingent on the following:

1. DNRC must approve the project scope of work and budget.
2. DHES and EPA must determine that this project will not conflict with future Superfund activities.
3. Butte-Silver Bow must provide further documentation that no liable party exists that could likely be held responsible for the damage to the storm drain system.

CHAPTER V

SUMMARIES OF PROJECTS NOT RECOMMENDED FOR FUNDING

Following are summaries of proposals that are not recommended for RDGP funding. The summaries are presented in alphabetical order according to the names of the applicants.

APPLICANT NAME: Butte-Silver Bow, Government of

PROJECT/ACTIVITY NAME: Development of a Mine Subsidence Insurance Program

AMOUNT REQUESTED: $101,550

OTHER FUNDING SOURCES AND AMOUNTS: Butte-Silver Bow - $8,880

TOTAL PROJECT COST: $110,430

PROJECT DESCRIPTION:

The overall objective of this project is to develop a sound basis for initiating a self-sustaining, hard-rock mining subsidence insurance program in the State of Montana. The general approach of the proposed project involves specific research and development and regulatory evaluation phases conducted by the Butte-Silver Bow government in an effort closely coordinated with the Montana Department of State Lands. A state-administered subsidence insurance program will be developed for the Central Butte Subsidence Area south of and adjacent to the central business district. The proposed project will develop the framework, regulatory and technical criteria, and administrative and financial requirements and procedures necessary to successfully implement a program to insure property against damages caused by land subsidence resulting from mining.

The long-term goal of these efforts is that insurance against subsidence-related damage caused by hard-rock mining be handled by the private insurance industry following guidelines established by the Montana Legislature. This project will develop the information needed for establishing the legislative guidelines and other essential information necessary for implementation.

TECHNICAL ASSESSMENT:

A principal cause of the subsidence problems in the central Butte area identified in this proposal was the excavation of ores

at the Emma and Travona Mines from the late 1930s until 1959, followed by backfilling with sands and flooding of the mines after mining ceased. During the active mining period, considerable subsidence took place. A report by Piper and Associates (1984) concludes that subsidence within this area is now very small, in comparison with the movement experienced during the period of active mining, and that movement will lessen over the years. However, some movement will continue to be experienced, and there is currently no practical technical remedy for this small amount of subsidence.

The effects of the flooding of the Berkeley Pit have not been discussed in this proposal. Although professionals often differ in their opinions, it is generally accepted that subsidence problems increase with fluctuations in moisture. Given the unknown extent of reflooding that will be realized in the Emma and Travona areas, the risk factor of subsidence is uncertain at this time. With this major issue unresolved, it appears that funding a mine subsidence insurance program to encourage building and/or rebuilding in this area would be unadvisable. The feasibility of such a program could be studied after the technical issues are investigated. Also, if similar programs have worked in other states, Butte should provide more information on these programs.

FINANCIAL ASSESSMENT:

Butte has requested $101,550 for this project. The project would be conducted in two phases: research and development of background information, and structural development of a subsidence insurance program. Both tasks would be accomplished using contracted services, with $22,600 budgeted for the first task, $66,450 for the second task, and $12,000 listed for the administering state agency, the Department of State Lands. The remaining $500 is budgeted for travel.

Comments from reviewers suggest that Butte has not requested enough funds to complete the project.

ENVIRONMENTAL ASSESSMENT:

This project, if successful, could have a positive effect on the human environment through actions to improve capital investment in the area. This project is in line with planning efforts to revitalize the Butte community. However, it appears that the risk of continued subsidence is still uncertain, and, therefore, the investment and improvement in this area may only be temporary. Therefore, the long-term adverse impacts may include the loss of improvements if future subsidence is substantial.

The open space concept for this area may be the most suitable alternative, in that this area remains subject to subsidence of an uncertain extent.

PUBLIC BENEFITS ASSESSMENT:

If the mine insurance program is successfully implemented, the private landowners in the central Butte neighborhood will receive the main benefits. The value of neighboring businesses

and homes may also increase with renewed interest and capital investment in the area. It is possible that the rebuilding of this area could benefit local government services by reducing crime and vandalism and increasing the tax base.

RECOMMENDATIONS:

No funding is recommended for this project. The application has not adequately demonstrated that there is no liable party, that the risk of additional subsidence would not be substantial, and that similar programs from other states could not be used as a model for the proposed insurance program.

APPLICANT NAME: Health and Environmental Sciences, Department of Solid and Hazardous Waste Bureau

PROJECT/ACTIVITY NAME: Pesticide Contamination Clean-up in Montana

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS:
DHES - $33,000
Environmental Protection Agency - $50,000
Custer County Airport Board - $5,000
Chouteau County - $2,000
Lake County - $5,000
Carbon County - $5,000
Dawson County - $2,000

TOTAL PROJECT COST: $402,000

PROJECT DESCRIPTION:

The Montana Department of Health and Environmental Sciences (DHES), in association with five Montana counties, is proposing investigation and clean-up of pesticide-contaminated sites in, or adjacent to, three rural airports and two weed control districts. The site names and locations are:

Miles City Airport - Custer County
Geraldine Airport - Chouteau County
Richey Airport - Dawson County
Lake County Weed Control District - Ronan
Carbon County Weed Control District - Joliet

All of these sites have pesticide-contaminated soils (and groundwater contamination at some sites) that pose health and environmental problems to the population and/or environment surrounding them. The first phase of the project will be

investigation of the sites to determine further the nature and extent of the contamination. The second phase involves evaluation of clean-up actions based on a health and environmental risk assessment. The third phase of the project will be implementation of clean-up measures.

TECHNICAL ASSESSMENT:

The applicant proposes to conduct in-depth assessment, risk analysis, and clean-up of pesticide-contaminated soils at five of the most seriously contaminated sites in Montana. The Montana Department of Agriculture (DOA) has previously investigated four of the contaminated sites (Lake County Weed Control District, Carbon County Weed Control District, Miles City Airport, and Geraldine Airport) and currently is investigating the fifth (Richey Airport). Site investigations have also been completed for the Lake and Carbon County Weed Districts under the federally administered Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), but these two sites did not qualify for Superfund action. The other three sites are also unlikely to meet Superfund scoring criteria for federal action.

As a result, remedial action will be conducted in accordance with Montana's Environmental Quality Protection Fund Act, or "mini-superfund" (75-10-904). This act allows for cost recovery should a responsible party be identified.

The project has been well coordinated with local, state, and federal agencies and has substantial local support. The Department of Agriculture will provide technical support through the Environmental Management Division, which is responsible for administering the Montana Pesticides Act.

Overall, the project is well documented. In that it involves investigation and remediation of sites where hazardous wastes or regulated substances threaten public health or the environment, it is an appropriate use of RDGP funds.

FINANCIAL ASSESSMENT:

EPA, DOA, and DHES have already spent $70,715 at the various sites. An additional $50,000 in EPA funds is being requested.

DHES will contribute $33,000 from the mini-superfund program account. Local government match funds total $19,000.

The counties are also willing to donate in-kind services, such as labor and equipment, to the project.

The total budget is $400,000, with a $300,000 grant requested from the Reclamation and Development Grant Program.

Complete clean-up of all five sites probably will not be accomplished without additional funds. If current funding is not sufficient, only the most severely contaminated areas at each site would be cleaned up.

ENVIRONMENTAL ASSESSMENT:

The short-term environmental impacts involve disruption, excavation, and removal of soils at the sites. These impacts will be minimized by the use of clean fill material to replace the contaminated soils. Removal of the contaminated soil will protect against the contamination of surface water and

groundwater. Removal of pesticides at these sites is important to reduce the hazard of exposure to contaminated soil dust particles and the potential for dangerous emission of toxic air pollutants in the event of a fire at these sites.

No long-term adverse environmental impacts would occur as a result of the project.

PUBLIC BENEFITS ASSESSMENT:

The communities located near the sites will benefit significantly from clean-up of these sites. The types of pesticides and herbicides found and the high concentration observed indicate an imminent and substantial health threat. Individuals may be exposed to contamination at the sites by ingestion or absorption (through the skin) of contaminated soils, inhalation of contaminated dust, and possibly ingestion or absorption of contaminated groundwater. The clean-up will reduce or eliminate the health risks associated with each site. Remedial action will also prevent further spread of contamination to ground or surface waters. These benefits are long term. Development, improvements, and new businesses now prohibited at the airport sites can proceed.

This project will be of economic benefit to the counties that do not have available funds for the clean-up and would have to tax county citizens to obtain the funding. Thus, not only does the project bring economic benefit to county government, but also to the citizens of the counties who would likely bear clean-up costs.

RECOMMENDATIONS:

No funding is recommended for this project. DHES will accommodate the funding level requested here through other means.

APPLICANT NAME: Health & Environmental Sciences, Department of, Solid and Hazardous Waste Bureau

PROJECT/ACTIVITY NAME: Responsible Party Clean-up of Selected Hazardous Waste Sites in Montana

AMOUNT REQUESTED: $300,000

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $300,000

PROJECT DESCRIPTION:

The Department of Health and Environmental Sciences (DHES) proposes to effect responsible party clean-up at selected hazardous waste sites in Montana.

This project would entail investigative and legal work

needed to obtain clean-up of a refinery dump and four abandoned oil refineries:

Lohof Gravel Pit - Billings
Big West Oil - Kevin
Diamond Asphalt - Chinook
Texaco Sunburst - Sunburst
Carter Oil Refinery - Cut Bank

The five sites all have petroleum waste products that may endanger public health or the environment. The sites have been abandoned and are unlikely to be cleaned up until responsible parties are ordered to take action. Before responsible party clean-up can be pursued, however, an administrative record must be compiled that documents owner and operator history, past waste disposal activities, and corporate history and financial status. Grant funds for this project would be used to compile the administrative record for those five sites and prepare the necessary legal orders to obtain clean-up.

The amount of investigative and legal work necessary will vary depending on the amount of available information about each site, the complexity of the situation, and the cooperation of the responsible parties. If all grant funds are not expended at the five sites identified, other sites impacted by mineral development will be included in the project.

Costs incurred in this project can later be recovered from responsible parties under both federal and state law. Thus, grant funds will be used as seed money to initiate hazardous waste site clean-up. Subsequently, other sites can be addressed through recovering and recycling the grant money.

TECHNICAL ASSESSMENT:

Most of the more than 150 hazardous waste sites in Montana are abandoned. Since many of the responsible parties are still financially solvent, DHES, through this proposed project, will pursue the investigative and legal research needed to obtain clean-up of the five sites by the responsible parties.

The extent of health and environmental problems at the sites is unknown because only cursory sampling has been conducted. Further investigation is needed to determine the extent of contamination and the risk the contamination presents. Without the investigative and legal work proposed in this project, the sites will not be cleaned up. Without clean-up, the sites will continue to pose health, environmental, and safety hazards.

The investigation will follow established procedures for investigating a site suspected of being contaminated with hazardous wastes. Site descriptions, preliminary sampling, and maps are enclosed in the grant application. EPA guidance documents will be used to gather additional information, where applicable.

The project will include two phases:

1. Responsible party search
2. Legal orders

Most of the work will be conducted by consultants under the direction of the DHES mini-superfund program manager and the state superfund lawyer. The legal mechanisms and fiscal channels are currently in place to carry out the project, both through federal statutes and the state mini-superfund law.

FINANCIAL ASSESSMENT:

The costs of investigative and legal work proposed in this project are potentially recoverable. If DHES is successful in obtaining responsible party compliance, then grant funds will be used toward enforcement of clean-up activities at other sites. This "seed money" request should ultimately cost the state less money and should result in considerably more money (from responsible parties) directed to site clean-up. It is anticipated that DHES will have to litigate at least the first site to demonstrate that the state will enforce its authority to compel potentially responsible party compliance. Once the precedent is established, the need for further litigation should decrease. This proposal recognizes that Montana does not have the financial resources to address these refinery sites or the more than 150 other uncontrolled hazardous waste sites. This proposal advances the concept that the only effective way to proceed is to identify the legally liable parties and obtain their financial contributions for clean-up.

The budget presented is an estimate. If less money is expended than budgeted, DHES proposes to undertake enforcement action at other sites with the remaining funds.

ENVIRONMENTAL ASSESSMENT:

The major long-term beneficial impacts will be the improvement of soil and water quality and the elimination of the potential health and safety hazards. Secondary beneficial impacts include: the potential for reuse or revegetation of the land after clean-up of contaminants; improved aesthetics of the site after removal of abandoned buildings, equipment, and waste pits; and increased employment for researchers, legal services, and clean-up contractors.

No known long-term adverse environmental impacts will result from this project.

PUBLIC BENEFITS ASSESSMENT:

Local communities surrounding the project sites will benefit most from this project. Without this project, public health and the environment of the local communities will continue to be adversely affected by the contaminated sites. Clean-up of these sites will lift federal housing restrictions in areas included on the Superfund list.

The research and legal methodologies used to obtain responsible party clean-up at the project sites can be used as a model for clean-up of other sites in Montana. In addition, other responsible parties at other sites may be encouraged to cleanup these sites without being forced to do so.

RECOMMENDATIONS:
No funding is recommended for this project. DHES will accommodate the funding level requested here through other means.

APPLICANT NAME: Montana Bureau of Mines and Geology

PROJECT/ACTIVITY NAME: Coal Lands Groundwater Monitoring

AMOUNT REQUESTED: $121,692

OTHER FUNDING SOURCES AND AMOUNTS: Applicant - $38,907

TOTAL PROJECT COST: $160,599

PROJECT DESCRIPTION:
Groundwater levels and quality near surface coal mines in southeastern Montana will be monitored for two additional years under this project. The project will show that:

1. Substantive changes in hydrologic conditions are occurring as a result of mining.
2. Water quality changes are thus far detrimental, but mitigating trends may be appearing.
3. Long-term hydrologic records are the only way of determining these effects.
4. Results of the work are continually being used and considered necessary by federal, state, and industrial planners.
5. Future developments of mineral extraction in Montana will be better planned and implemented with use of this historical knowledge.

The monitoring work will consist of measuring water levels monthly at 200 wells and collecting water samples semi-annually at selected wells where the quality of natural water can be compared to the quality of mining-related water. Data will be entered into a computer file, sorted, interpreted, and disseminated. Interpretations of the data will be based upon highly detailed knowledge of the mines, the reclamation, the geology, and the hydrology.

TECHNICAL ASSESSMENT:
This project was submitted to DNRC's Water Development Program (WDP) in 1987. The WDP was not considered an appropriate source of funding for a long-term project (18 years to date), and the recommendation was that the applicant seek funds from other sources. Apparently, such funding was obtained.

The current request raises the same concern over the appropriateness of funding a long-term program. If the principal users of this information -- i.e., regulatory agencies and mining companies -- feel strongly that the effort should be continued, then continuation should be realized through permit actions or agency budgets.

FINANCIAL ASSESSMENT:
The amount requested is $121,692. Project costs include contract administration ($51,960), employee benefits ($17,140), contracted services ($8,400), supplies and materials ($5,500), travel ($11,710), rent and utilities ($4,800), equipment ($900), and miscellaneous ($21,282).

ENVIRONMENTAL ASSESSMENT:
The project will have no short- or long-term adverse environmental impacts.

PUBLIC BENEFITS ASSESSMENT:
The information gathered would aid in verifying monitoring data required of mining companies.

RECOMMENDATION:
No funding is recommended for this project.

APPLICANT NAME: Montana Bureau of Mines and Geology

PROJECT/ACTIVITY NAME: Effect of Initial Moisture Conditions on Movement and Residual Saturation of Hydrocarbons in Montana Soils

AMOUNT REQUESTED: $97,083

OTHER FUNDING SOURCES AND AMOUNTS: Montana Bureau of Mines and Geology - $18,327

TOTAL PROJECT COST: $115,410

PROJECT DESCRIPTION:
The proposal is to investigate the effects of soil porosity and initial moisture content on the amount of a hydrocarbon retained in soils. The rate of release of retained hydrocarbons will also be evaluated. The objective is to develop a method of quantifying the volume of hydrocarbon remaining in the soil after contamination.
The project is a laboratory study in which three soil types will be sampled and characterized as to particle size distribution, bulk density, and porosity. Moisture retention

curves will also be plotted for each soil. Duplicate samples of each soil will be placed in leaching columns in controlled environment chambers. A selected hydrocarbon will be added to the columns until the samples are saturated. The amount of residual hydrocarbon will be determined gravimetrically for each soil over a range of moisture contents.

The rate of hydrocarbon release will be determined by flushing the columns with several pore volumes of water and plotting a desorption curve. Hydrocarbon analysis will be performed using a gas chromatograph/mass spectrophotometer. The relationship established in the laboratory between the hydrocarbon volume retained and soil properties will be verified by conducting the column study on contaminated and uncontaminated soils sampled at actual spill sites.

TECHNICAL ASSESSMENT:

The general project objective is to provide needed information about the hydrocarbon retention and release properties of Montana soils. Because of the tremendous soil variability in Montana, it is doubtful that a significant amount of information can be obtained from research performed on only three soil types. Hydrocarbon retention and release figures derived from the column study would describe conditions for disturbed soil. Those responsible for spill clean-up must establish a relationship between the study results and hydrocarbon retention in undisturbed soils before the research can be useful.

In designing the study, the applicant has assumed the prime importance of initial moisture content to hydrocarbon retention. Although this is an influencing factor, soil moisture can vary laterally within a spill area as well as with depth, and it can change over time because of weather conditions. Soil temperature, organic matter content, clay minerology, and hydrocarbon viscosity are also factors affecting hydrocarbon behavior that are not included as dependent variables in the study. The proposal states that one or several hydrocarbon compounds will be used in the study. More specific information on the number and kind of compounds would help in preparing an accurate technical assessment. No mention is made of who will be conducting the gas chromatograph/mass spectrophotometer analysis, how many analyses are anticipated, or whether the laboratory plans any quality control or quality assurance operations for this expensive procedure.

As outlined in the proposal, the study would provide information on the amount of a hydrocarbon retained and the rate at which it is released from three different soil core samples at several moisture levels. A relationship between moisture content and hydrocarbon behavior established by the study would have predictive value for quantifying residual hydrocarbons in a disturbed soil having a similar moisture content and porosity value. It is doubtful whether this relationship would be useful as a basis for calculating the volumes of residual hydrocarbons in Montana soils under field conditions.

FINANCIAL ASSESSMENT:

Several budget categories need clarification or explanation. The benefits category ($11,566) is 33 percent of salaries and wages. The cost of the analyses under the contracted services category ($23,000) should be broken down to unit prices. Three different soil types could be found near the Montana College of Mineral Science and Technology in order to reduce travel and drilling costs. Anticipated mileage figures should be given. The costs of column and growth chamber construction appear to be high. Chambers can be rented for significantly less than the listed construction costs. Column construction materials should be listed in order to be accurately assessed.

ENVIRONMENTAL ASSESSMENT:

As proposed, the project will have no adverse environmental consequences.

PUBLIC BENEFITS ASSESSMENT:

According to the proposal, the study will satisfy public need because it is intended to produce a method of accurately estimating the amount of soil that must be removed from hydrocarbon spill sites. It is unlikely that such a method will result from the study because many of the factors that affect hydrocarbon behavior in soils will not be considered. The study may benefit the public indirectly by establishing a relationship between soil moisture and hydrocarbon retention.

RECOMMENDATION:

In order to justify funding, the study should be reorganized to investigate the effects of a more complete set of variables on hydrocarbon retention in a single soil type. Once the relative importance of these variables is established with statistical confidence, the study could perhaps be expanded to other representative Montana soils. No funding is recommended for this project as proposed.

APPLICANT NAME: Red Lodge, City of

PROJECT/ACTIVITY NAME: West Bench Slope Stabilization

AMOUNT REQUESTED: $82,500

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $82,500

PROJECT DESCRIPTION:

The western edge of Red Lodge is marked by an unstable terrace face (West Bench) which creates a hazard to the city

residents located downslope. Reports of mudslides and landslide incidents are well documented. The city is seeking funding to complete a feasibility study as the first phase of a two-phase effort. The second phase would include design and construction. The first-phase (grant request) objectives are to:

1. Define geologic and hydrologic balance of the West Bench
2. Define drainage and stabilization alternatives
3. Complete cost comparisons of the alternatives
4. Prepare a financial plan for the selected alternative

A consultant would be hired to conduct the study, including the installation of test wells and pits to obtain the necessary information regarding geologic and hydrologic conditions.

TECHNICAL ASSESSMENT:

The Soil Conservation Service (SCS) conducted a study in 1986 in an attempt to develop a P.L. 566 watershed project for the area. The project was sponsored by the irrigators in the project area and identified several problem areas, including:

1. The four canals frequently paralleled each other.
2. Water management was inefficient.
3. The surface aquifer filled from leaking ditches and overapplication of irrigation water.
4. Water seeped from the bench into Red Lodge.
5. There was a conflict between irrigators and the city of Red Lodge during times of water shortages.

Although the SCS pointed out the benefits to be derived from ditch consolidation and improvement in on-farm efficiency, irrigators felt the benefits didn't outweigh the costs. Also, legal constraints prevented forming one irrigation entity, and the project was terminated.

The present proposal is an attempt to evaluate a slope stabilization method utilizing drains to remedy the problem and to compare this solution to reconfiguring the irrigation system. Slope stabilization using drains deals only with the effects of slope loading through poor ditch efficiency and overirrigation and would likely require long-term maintenance. Correcting the cause of the problem would necessitate curtailing ditch leakage and overirrigation. Improving irrigation water management should be the first increment of correction.

FINANCIAL ASSESSMENT:

The total project cost is $82,500, all of which is requested as grant money. Most of the funds ($60,000) would go toward engineering costs in preparing a final report to compare (1) controlling irrigation water leakage through irrigation improvements, with (2) draining the discharge and disposing of the captured water.

Drilling and backhoe services, plus materials, are estimated at $20,000. No specific costs for each engineering task are

provided. The estimated costs for the engineering seem high, given the SCS data that are available. The cost for drilling and backhoe work (ten small-diameter wells and four backhoe pits) is $20,000, with $3,000 of that for materials; these figures also appear high. The city of Red Lodge is not contributing funds, presumably because it is nearly $1.8 million in debt.

ENVIRONMENTAL ASSESSMENT:
The project would only evaluate alternative means of dealing with the problem; further funding would be required to implement the selected alternative. If the drainage system were selected, only the effects of saturating the bench would be addressed, although it would require improved irrigation management and ditch consolidation to solve the primary problems. Longer term success, and thus environmental benefits, would be realized with the irrigation improvement option, with few if any impacts. For this proposal, minor impacts from the construction of wells and pits would be the only environmental effects.

PUBLIC BENEFITS ASSESSMENT:
Limited benefits would accrue from this study because no remedial action would be taken. The only purpose of this study is to evaluate alternative methods of addressing the problem.

RECOMMENDATIONS:
No funding is recommended for this project because the cause of the problem has been well documented. Any money raised should be applied to solving the basic problem, rather than dealing with the secondary effects.

APPLICANT NAME: State Lands, Department of (DSL)

PROJECT/ACTIVITY NAME: Emergency Non-coal Mine Reclamation Program

AMOUNT REQUESTED: $100,000

OTHER FUNDING SOURCES AND AMOUNTS: DSL - $25,000

TOTAL PROJECT COST: $125,000

PROJECT DESCRIPTION:
Within the 200 hard rock mining districts of central and western Montana are thousands of abandoned mine sites. A common practice used by mining companies as they abandoned mine shafts was to place a wooden bulkhead 20 to 30 feet down the shaft, and then backfill the shaft from the bulkhead to the surface. Over time, the bulkheads rot and eventually fail, resulting in the sudden appearance of hazardous open holes. Several recent

instances of such events have been documented by the applicant, and the situation will undoubtedly continue to occur in the future.

The applicant proposes to abate these mine hazards immediately by backfilling and capping the mine openings. Other life-threatening non-coal mine hazards, such as water and air pollution, landslides, steep highwalls, and hazardous explosives, will also be addressed.

TECHNICAL ASSESSMENT:

The proposed project is clearly presented and well documented. It represents a logical and necessary approach to addressing life-threatening situations caused by non-coal mineral development. Information compiled by the applicant indicates that a series of shaft and adit failures requiring immediate action can be expected to occur in the 1990-91 biennium.

It is, of course, impossible to predict precisely the number and extent of these failures;hence, the funding request may or may not be adequate. Should the cost of remedial action exceed the $125,000 total funding, DSL proposes to take all necessary measures to stabilize the situation temporarily. After the immediate, life-threatening condition has been addressed, permanent measures will then be accomplished through the normal Abandoned Mine Reclamation Program (AMRP) procedures when funding has been applied for by DSL and approved by the federal Office of Surface Mining.

Needed resources to implement this program -- i.e., project design, procurement, accounting, and contract administration -- are already in place as the result of the federally funded Abandoned Mine Reclamation Program administered by DSL. The AMRP does not cover emergency projects unless they are coal-related. Thus, it appears the proposal would be an appropriate use of RDGP funds--if no other funding mechanisms were available.

However, Montana's Environmental Contingency Account (75-1-1101) addresses the same type of project: emergency mineral development threats to persons, property, or the environment. This program receives $175,000 per bienium of Resource Indemnity Trust funds. Present usage of this account suggests that sufficient funds will be available to provide the $100,000 requested here. Until the contingency account funds are shown inadequate to meet the applicant's needs, use of RDGP funds appears unjustified.

FINANCIAL ASSESSMENT:

The Emergency Non-coal Mine Reclamation Program is estimated to cost $125,000 for FY 90 and 91. Funding for the program is proposed to be from a RDGP grant ($100,000), and from the Department of State Lands, Abandoned Mine Reclamation Bureau ($25,000).

Project implementation involves obtaining landowner approval of the proposed work, design, and contracting; from past reclamation projects, it has been calculated that these tasks will cost approximately 25 percent of the construction cost. Construction costs were calculated by using unit prices that have

actually been bid on similar mine reclamation projects. Contract administration and construction inspection will be conducted by Abandoned Mine Reclamation Bureau personnel using non-RDGP funds.

The Emergency Non-coal Mine Reclamation Program does not have specific project sites identified. Because the funds for this program will be spent on an "as-needed" basis, exact line item projected costs cannot be listed at this time. Rather, as program cost documentation, examples of past non-coal reclamation costs were provided. The budget is not excessive and is reasonable for the type of work performed.

ENVIRONMENTAL ASSESSMENT:

Construction may involve short-term impacts to the environment such as increased levels of noise and dust. No long-term adverse environmental impacts would occur as a result of the project. The environment would be improved by reductions in water pollution, air pollution, steep highwalls, landslides, and life-threatening emergencies.

PUBLIC BENEFITS ASSESSMENT:

The benefits of this program would be significant. Residents of Anaconda, Butte, Helena, Philipsburg, Rimini, and numerous other communities in or near hard rock mining districts will be protected from life-threatening mine-related hazards. Public interest in mining camps and the towns that grew out of the early camps has greatly increased the tourism in areas of historic mining. Thousands of visitors as well as Montana residents will directly benefit from this program.

This program will stop continued property damage and the associated decrease in property value.

This program will provide jobs and work for local contractors, suppliers, labor, and some industries.

RECOMMENDATIONS:

This project was submitted for RDGP grant funding in 1986 and not recommended for funding because of the availability of Environmental Contingency Account funding. The recommendation also provided that, if Environmental Contingency Account funds were inadequate, the RDGP program should be reconsidered. Based on the number of requests by the applicant to the account and the amount requested, it appears that the need for RDGP funds at this time has not been established.

APPLICANT NAME: State Lands, Department of

PROJECT/ACTIVITY NAME: Galena Creek Mill Tailings Reclamation Project

AMOUNT REQUESTED: $236,000

OTHER FUNDING SOURCES AND AMOUNTS: None

TOTAL PROJECT COST: $236,000

PROJECT DESCRIPTION:

Galena Creek is a small tributary located in the uppermost drainage of Belt Creek near Monarch, Montana. The Galena Creek drainage contains numerous abandoned hard rock mines, several mine tailings dumps, and a mill site with two large tailings ponds. This reclamation project is located at the mill site and the mill tailings ponds, which lie at the confluence of Galena Creek and Dry Fork Belt Creek. Several small drainages which pass through the tailings ponds have eroded tailings into Galena and Dry Fork Belt creeks. In addition, ponded surface water on the tailings has caused leaching of heavy metals into groundwater and surface waters at the project site. The leachate has degraded the water quality in Galena and Dry Fork Belt creeks, resulting in an absence of fish and aquatic bottom life. Wind erosion of the mill tailings, which are devoid of vegetation, is a safety hazard to local residents, livestock, and wildlife.

Under the proposed reclamation plan, the tailings material will be graded to ensure surface water runoff and eliminate infiltration of water into the tailings. A diversion ditch will be placed upslope to divert flows around the tailings area. Mill tailings material that has previously been eroded from the ponds will be cleaned from the county road ditch and from Galena Creek. The old ruins at the mill site will be demolished and buried. All disturbed areas will be topsoiled and revegetated. Reclamation at the project site is intended to improve water quality in Galena and Dry Fork Belt creeks, re-establish the aquatic environment, eliminate safety hazards, and improve the aesthetics of the area.

TECHNICAL ASSESSMENT:

Although the reclamation techniques proposed are sound, they do not appear to be cost-effective at this time. Major sources of heavy metal pollution and acid mine drainage exist immediately upstream from this proposed project. Because nearly all the pollutants carried by Galena Creek come from these upstream sources (located in the Block P mine area), it is doubtful that the remedial action proposed here will result in significant water quality improvements. An operating mine permit for re-establishment of mining in the Hughesville area (including the Block P mine) is currently active. Removing the upstream pollutant sources through this avenue would probably be a more cost-effective water quality improvement process than the proposed project and should be explored further. If the upstream pollutants are reduced or eliminated, this application should be reconsidered.

FINANCIAL ASSESSMENT:

The Department of State Lands is requesting grant funds for

the entire amount of the reclamation project. All services required for this project will be awarded to qualified contractors. Engineering, permitting, administration, and construction inspection will be contracted to a consulting engineering firm experienced in mine reclamation. Construction will also be a contracted service which will be awarded to a qualified contractor through competitive bidding.

The Galena Creek Mill Tailings Reclamation Project is estimated to cost $236,000. Construction cost is estimated to be about $200,000 for the work scope as outlined in this application. The costs are reasonable for the work proposed; however, as mentioned earlier, the benefit of this project is severely diminished due to other upstream pollution sources.

ENVIRONMENTAL ASSESSMENT:

No long-term adverse impacts to the environment are expected.

PUBLIC BENEFITS ASSESSMENT:

Removal of tailings material from Galena Creek and reclamation/revegetation of the mill site and tailings ponds will have a limited effect on the overall environment. Water quality in the streams at the project site and downstream in Dry Fork Belt Creek would probably be improved, but the extent is uncertain. Heavy metal contributions to the creek and erosion of the tailings material might decrease. Erosion of soil from disturbed areas will also be reduced by grading and revegetation. Revegetation will improve habitat and restore a food supply for wildlife. Covering the tailings material and revegetating the disturbed areas will reduce dust emissions. Grading, topsoiling, and revegetation of the disturbed areas will improve the visual aspect of the area.

RECOMMENDATION:

No funding is recommended for this project.

CHAPTER VI

PROJECT STATUS REPORT

of

PROJECTS APPROVED FOR FUNDING BY THE

1985 LEGISLATURE

This chapter summarizes the status of projects that were funded by the 1985 Montana Legislature. The projects are listed in order of funding priority.

1. Agriculture, Department of, Weed Control Trust Fund

This project has been completed. The purpose of the grant was twofold: first, to establish a program to provide technical and financial assistance to local communities implementing weed management projects; second, to establish a weed trust fund designed to encourage long-term development and continuation of local weed management programs. Of the $1,000,000 appropriated for this project, the Noxious Weed Trust Fund received $500,000; of the other half of this grant, $495,000 went to fund over 20 weed control and research projects, and one percent, or $5,000, was used for administrative costs.

2. Montana State University, Water Resources Research Center, Stream Restoration from Placer Mining on Grasshopper Creek

A contract for this project has been executed. The primary purpose of the grant was to establish favorable trout habitat in areas adversely impacted by mining.

Funds in the amount of $8,737 have been disbursed. The Phase I analysis revealed an exceedingly low population of trout in part of the study area. Because of this, it is unlikely that the trout resource would be improved by the management methods originally planned. The reason for the low number of trout in this area is unknown, and determination of the cause is beyond the scope and budget of this project. Therefore, this project will be terminated with approximately $49,529 remaining to be expended. The 1985 legislature appropriated $58,266 for this project.

3. Montana Bureau of Mines and Geology, Field and Office Programs--Groundwater Information Center

A contract for this project has been executed. The purpose

of this project is to develop a computerized groundwater data management program to organize and disseminate Montana's groundwater data. Programming to access the water well log system has been completed, although some debugging is necessary. The development of the microprocessor-based satellite data system is near completion. The project should be completed by January 1989. The 1985 legislature appropriated $75,000 for this project.

4. Anaconda-Deer Lodge County, Deer Lodge Valley Conservation District, Headwaters Resource Conservation and Development Area, Anaconda Soil Stabilization and Erosion Control

A contract for this project has been executed. This soil erosion control project involves planting trees, shrubs, and grasses on the steep hills south of Anaconda that have been impacted by timber harvesting and smelting operations over the years. More than 100,000 trees and shrubs have been planted, with an average overall survival rate of 62 percent over the past three years. A settling basin to control runoff into Anaconda from these hills was built in June 1988. The 1985 legislature appropriated $150,000 for this project.

5. Montana State University, Water Resources Research Center, Stream Restoration of Confederate Gulch and Deep Creek

A contract for this project has been executed. The primary purpose of this project was to improve the fishery habitat. Several treatment measures were designed, including riprap, cable tree revetment, and log sill structures.

Construction of bank stabilization structures was completed in the spring of 1988 along Deep Creek. The constructionof gravel-trapping log sills along upper Confederate Gulch was conducted in the summer of 1988. The follow-up analysis of fisheries and habitat structure will be conducted in the near future. The 1985 legislature appropriated $134,249 for this project.

6. Health and Environmental Sciences, Department of, Solid and Hazardous Waste Management Collection and Transfer Project

A contract for this project has been executed. The 1985 legislature appropriated $800,000 for the implementation of a hazardous waste management strategy for Montana. A study conducted by a consultant for DHES recommended a collection system with a central transfer and storage facility, with disposal of the waste at an out-of-state permitted facility. Approximately $115,000 was disbursed for this study, which was presented to the 1987 legislature. The legislature instructed DHES not to proceed with construction of a hazardous waste

facility. Instead, of the remaining funds, $212,000 was reappropriated in HB 6 in 1987 to assist businesses and industry in minimizing or eliminating the amount of hazardous waste they generate. HB 6 also requires that a report be submitted to the legislature regarding the level and costs of services provided by the private sector. The remainder of the funds stayed in the RDGP account.

7. Butte-Silver Bow, Government of, Butte Hill Mining Reclamation

This project, involving the reclamation of an inactive mine site, reconstruction of three ballfields, and drainage control structures in the Butte Hill area, has been completed. The inactive mine site was reclaimed and converted to a city park, the Emma Mine Park. Construction at the three ballfields involved removing contaminated materials, recontouring, installing drainage control, and revegetating. In addition, drainage control structures were designed and constructed in the Walkerville area to control runoff from mine waste dumps into residential areas. The 1985 legislature appropriated $500,000 for this project.

8. Toole, County of, North Toole County Reclamation Project

A contract for this project has been executed. The purpose of this project is to demonstrate oil field reclamation techniques, and it includes removal of debris and waste with subsequent site restoration. A subcontract was executed with the Montana Salinity Control Association (MSCA) for the purpose of investigating the feasibility of reclamation procedures on oil-contaminated soils and the impacts on shallow groundwater. Three sites have been reclaimed, and design specifications are being prepared for an additional twelve. Preliminary findings of the MSCA study are expected during the fourth quarter of 1988. Most of the remaining funds will be spent during clean-up activities in the spring of 1989. The 1985 legislature appropriated $298,130 for this project.

9. Governor's Office, Clark Fork River Project

A contract for this project has been executed. The project was divided into two parts: (1) Clark Fork River monitoring, and (2) suspended sediment sampling (conducted by the U.S. Geological Survey). Both portions have been completed and the data used for the Governor's Water Management Plan for the Clark Fork River Basin. The 1985 legislature appropriated $130,000 for this project.

10. Natural Resources and Conservation, Department of,

Conservation Districts Division, Reclamation of Streambanks and Adjacent Areas Damaged by Placer Mining

A contract for this project has been executed. The purpose of this project is to provide funding to conservation districts to undertake reclamation projects on streambanks and adjacent sites damaged primarily by placer mining activities. Negotiations are continuing with landowners in Madison and Meagher counties. Project start-up on three projects is expected in spring of 1989. The 1985 legislature appropriated $30,000 for this project.

11. Mile High Conservation District, Reclamation Techniques for Heavy-metal-contaminated Agricultural Lands

A contract for this project has been executed. The purposes of this project are to develop reclamation techniques for heavy-metal-contaminated agricultural lands and to evaluate whether changes in land use impact the surface and groundwater resources of the area.

The vegetative portion of this project is almost completed. The hydrogeologic portion of the project has been extended to try to obtain soil-water data for at least two years. Preliminary results have been analyzed, and a final report should be submitted in June 1989. The 1985 legislature appropriated $88,400 for this project.

12. Governor's Office, Cabin Creek Reference to the International Joint Commission (IJC)

This project has been completed. The purpose of this project was to gather information regarding the proposed Cabin Creek coal mine located in British Columbia, assess the potential impact on Montana, and present the findings to the IJC. The 1985 legislature appropriated $80,000 for this project, and $40,000 was disbursed. In HB 6 in 1987, the remaining $40,000 was reauthorized to the Governor's Office for the oil and gas programmatic environmental impact statement.

13. Montana State University, Water Resources Research Center, Environmental Fate of Cyanides and Heavy Metals from Historic Cyanide Leach Operations in the Judith Mountains

This project has been completed. The purpose of the project was to attempt to characterize the residual cyanides and heavy metals associated with inactive leach operations. This study has provided a priority list of the types of cyanide heap-leach sites that should be reclaimed. In addition, this project resulted in recommended characteristics that could be used to determine sites with a higher risk for leaching unacceptable

levels of metals and cyanides. The 1985 legislature appropriated $20,000 for this study.

14. Health and Environmental Sciences, Department of, Scobey Air Quality Monitoring

This project has been completed. The purpose of the project was to assess the air quality impact of the emissions from two 350-megawatt, coal-fired generating units located at Coronach, Saskatchewan. A limited air monitoring program was conducted near Scobey, Montana. DHES hired a part-time operator and measured sulfur dioxide, sulfation rate, total suspended particulates, wind speed, wind direction, and temperature from September 1986 to June 1987. There were some slightly elevated levels of sulfur dioxide when the wind was blowing from the power plant to the samplers. The measured concentrations were not high enough to cause harm to human health or vegetation. The 1985 legislature appropriated $15,000 for this project.

15. Montana State Library, Natural Resources Information System and Natural Heritage Program

This project has been completed. The purpose of this project was to develop a natural resource information system, implement the system, and establish an ongoing Montana natural heritage system as provided in 90-15-101, MCA. Over 5,000 Montana Natural Resource Index records have been indexed both by subject and geographic area. Resource collections from other agencies are also being incorporated into this index, which should greatly increase the number of records. The Natural Heritage Program has completed over 6,000 records of rare or exemplary plants, animals, and communities; vertebrate characterization abstracts; source abstract files; and managed-area abstracts. These programs have answered over 600 information requests on subjects ranging from potential occurrences of rare and endangered species for proposed mines to weed environmental impact statement proposals for forest land administration. Many special projects have been completed through the request and support of other state and federal agencies and private corporations and individuals. The 1985 legislature appropriated $225,561 for this project.

16. Red Lodge, City of, Coal Miner's Memorial Park Revegetation and Irrigation Project

A contract for this project has been executed. The purpose of this project is to provide soil stabilization and landscaping on a recently reclaimed coal dump and landfill. The design and installation of an irrigation system and a landscape plan are included.

The 1985 legislature appropriated $100,000 for this project. Final plans and specifications have been completed.

17. Triangle Conservation District, Expanded State Salinity Program

This project has been completed. The purposes of this project were to locate the recharge or contributing areas for saline seep in a 33-county area; provide information and assistance to landowners, conservation districts, and the SCS; and develop a cooperative control and management plan to minimize or eradicate saline seeps. Nineteen reclamation plans were delivered in the spring of 1987, and drilling and fieldwork for 20 additional plans were completed during the 1987 field season. There are now approximately 270 plans completed with active involvement by about 150 cooperators. The 1985 legislature appropriated $150,000 for this project.

18. Powder River Conservation District, Irrigation Water Quality Study

A contract for this project has been executed. The purpose of this project was to determine the potential long-term effects of irrigation on soils adjacent to the Powder River. Soil productivity and crop performance would be related to past and present water quality.

The 1985 legislature appropriated $80,000 for this project.

19. Glen Lake Irrigation District, Theriault Creek Syphon Construction

A contract for this project has been executed. The purposes of this project were to design and construct a syphon in an unstable portion of the irrigation district's main canal.

The syphon has been constructed. The 1985 legislature appropriated $32,000 for this project.

20. Montana State University, 49th Parallel Institute, Montana/Alberta Milk River Joint Impoundment Assessment

This project has been completed. The purposes of this project were to identify, evaluate, and facilitate all avenues of U.S./Canadian cooperation that could lead to alleviating water shortages in the Milk River Basin of Montana and Alberta. The 49th Parallel Institute has been working with state, federal, and provincial officials and private individuals to inform the affected water users in the Milk River Basin of all available

courses of action to alleviate water shortages. The institute coordinated a meeting in Lethbridge in April 1987 where Montana officials shared their concerns regarding the potential environmental impacts of the Alberta dam on the Milk River Basin. The institute also cooperated with state and federal officials to compile and present information regarding the status of international discussions on irrigation system improvement options to Milk River Basin residents in two public meetings in May 1987 and January 1988. The 1985 legislature appropriated $70,000 for this project.

21. Montana Bureau of Mines and Geology, Williston Basin Reclamation

A contract for this project has been executed. The purposes of this project are to document the damage to soils and shallow aquifers from saline waters associated with oil exploration drilling, to test soil reclamation concepts, and to recommend procedural changes to reduce the problems.

This project should be completed by June 1989. Water levels and field water quality data are periodically monitored at the two study sites: one mud disposal pit area near Fairview, and one oil well site and associated reserve pit near Sidney. Preliminary conceptual models of groundwater flow and contamination migration have been prepared. The soil reclamation aspect of this study is progressing, with soil sampling and some revegetation planning completed. The 1985 legislature appropriated $91,870 for this project.

22. Anaconda-Deer Lodge County, Sewage Facilities

A contract has not been executed for this project. A grant of up to $70,000 was approved for sewage treatment facilities for Anaconda-Deer Lodge County. These funds will be used either to pay a portion of the Water Development loan from DNRC for improvements to this facility or to fund a portion of the additional work needed on the discharge structure of the sewage treatment facility.

CHAPTER VII

PROJECT STATUS REPORT

of

PROJECTS APPROVED FOR FUNDING BY THE

1987 LEGISLATURE

This chapter summarizes the status of projects that were funded by the 1987 Montana Legislature. The projects are listed in order of funding priority.

1. State Lands, Department of, Upper Blackfoot River Streambank Reclamation

This project is under contract, but no funds have been disbursed as of October 1988. Initial bids exceeded available funds. Lewis and Clark Conservation District has submitted a RDGP grant application for consideration by the 1989 legislature proposing additional clean-up of mine wastes along the Upper Blackfoot River that could be coordinated with this project. The construction portion of this project won't begin until after the legislative session so that the two projects can be possibly coordinated. The 1987 legislature appropriated $107,000 for this project.

2. Health and Environmental Sciences, Department of, Clark Fork Monitoring

Continued reporting and assessment of all past Clark Fork data collected under this program will be the primary goals of this contract. The data base and a concise water quality narrative will be published for each year that data are available (FY85-89). The first quarter (FY89) activities were mainly oriented toward summer field monitoring during the record low flows of the summer of 1988. Routine water quality monitoring and expanded nutrient monitoring were conducted the second quarter. A contract for processing the FY89 Clark Fork macroinvertebrates samples will be finalized and samples delivered. The 1987 legislature appropriated $205,590 for this project.

3. Fish, Wildlife and Parks, Department of, High Ore Creek Reclamation Project

A contract for this project has been executed. The purpose of this project is to improve the water quality of High Ore Creek and the Boulder River. Both drainages are adversely impacted by

metal contaminants originating at this site. Consent for right of entry agreements were reached with all of the lessees and landowners affected by the High Ore Creek Reclamation Project. A professional service contract was entered into between the Department of Fish, Wildlife and Parks and a consultant to prepare final engineering plans. To date the contractor has reviewed the site with the agency representative and has begun engineering work to prepare the reclamation plan design. The 1987 legislature appropriated $198,600 for this project.

4. State Lands, Department of, Snowshoe Creek Streambank Reclamation

The purpose of this project is to reclaim streambanks, floodplains, and disturbed areas damaged by hard-rock mining activities in the Snowshoe Creek watershed near Libby, Montana. Design and bid specifications have been prepared, and a contractor has been selected. Construction completion will be dependent on weather conditions. The 1987 legislature appropriated $107,000 for this project.

5. Oil and Gas Conservation, Board of, Plug Wilkstrand Simero Number 1, Cut Bank

The 1987 legislature appropriated $19,951 for this project. Because RDGP funds were not available immediately and an emergency situation developed, the board applied for and received funds from the Environmental Contingency Account. The well was subsequently plugged, and the $19,951 was used to reimburse the Environmental Contingency Account funds.

6. Health and Environmental Sciences, Department of, Bannack State Park-Apex Mill Hazardous Waste Clean-up

Preparation of engineering costs and specifications for specific remedial actions is nearing completion, with selection of the clean-up contractor anticipated by 1988 year-end. Extensive soil sampling and hydrological monitoring are being conducted in order to select the most cost-effective clean-up measures. The legislature appropriated $101,200 for this project.

7. Toole, County of, North Toole County Reclamation Project

As of October 1988, a contract has been drafted with expected execution by 1988 year-end. The activities proposed are an extension of an earlier grant approved by the 1985 legislature. Both projects will run concurrently, with expected completion by July 1989. The 1987 legislature appropriated $150,000 for this project.

8. State Lands, Department of, Nellie Grant Mine Reclamation

This project has not commenced, pending final determination of a responsible party. The 1987 legislature appropriated $84,900 for this project.

9. Health and Environmental Sciences, Department of, Abandoned Oil Refineries

A consultant has been selected to conduct sampling activities and develop a clean-up plan for the ARRO Refinery site. A risk assessment and feasibility study will be contracted during the fourth quarter of 1988. Based on the results of these studies, DHES will decide on the appropriate remedial action. Clean-up is anticipated in the spring of 1989. The 1987 legislature appropriated $300,000 for this project.

10. Fish, Wildlife and Parks, Department of, Cataract Creek Reclamation Project

DNRC has been advised of a pending enforcement action by the Department of State Lands. This project is therefore on hold until the matter is resolved. The 1987 legislature appropriated $21,565 for this project.

11. Sheridan County Conservation District, Reserve Pit and Oil Field Brine Disposal Assessment

Work completed thus far includes initial site inventory of over 200 sites. Twenty-three of the sites were selected for further investigation including detailed water sampling and soil conductivity. Needed well drilling and technical expertise is being furnished by the Montana Bureau of Mines and Geology. Intensive monitoring on two of the twenty-three sites will begin next spring. The 1987 legislature appropriated $100,000 for this project.

12. Oil and Gas Conservation, Board of, Plug Sunburst Disotell Well Number 1

The subject well involved a liable party and was plugged by Phillips Petroleum Company, thus eliminating the need for RDGP funds. The 1987 legislature appropriated $55,000 for this project.

13. Oil and Gas Conservation, Board of, Plug Well Leaking Gas, Gas City Field, Dawson County

The plugging contract has been awarded with completion expected in November 1988. The 1987 legislature appropriated $46,330 for this project.

14. Montana State Library, Natural Resource Information System and Natural Heritage Program

Records will continue to be added to the NRIS and Natural Heritage Program. These programs will coordinate with other agencies to catalog resource collections and develop standards for collecting data to ensure quality and compatibility of the data. These programs will provide clearinghouse and referral services for natural resource data. The 1987 legislature appropriated $177,970 for this project.

15. Montana Salinity Control Association, Montana Salinity Control Program

This project has commenced with continued work on reclamation of saline seep areas in Montana. Approximately 50 reclamation plans should be developed over the biennium. The 1987 legislature appropriated $300,000 for this project.

16. Butte-Silver Bow, Government of, Anselmo Mine Yard Reclamation Project

A scope of work is presently being developed for this project, which should be under contract soon. The 1987 legislature appropriated $150,000 for this project.

17. Lower Musselshell Conservation District, Groundwater from Abandoned Mine Workings for Irrigation and Instream Flows, Lower Musselshell River

A resource inventory and literature search are now being conducted. Necessary permits are being applied for--in particular, an interim water use permit which will allow the conservation district to go ahead with its planned 7-day preliminary pump test. DNRC is currently reviewing the application. Also, the subcontract for the water availability study has been executed, and gauging stations have been installed. The 1987 legislature appropriated $272,320 for this project.

18. Oil and Gas Conservation, Board of, Programmatic Environmental Impact Statement

In order to gather comments on the issues and concerns to be

addressed in the impact statement, three public meetings were held in November 1987. A broad spectrum of comments was raised by industry, interested citizens, landowners, and environmental groups. The Oil and Gas Drilling Advisory Council has twice reviewed and commented on drafts of each chapter of the programmatic impact statement. Joint meetings between the council and the board will continue as they select a process to accomplish the objectives of SB 184 which mandated preparation of the EIS. The draft programmatic statement is currently being finalized for printing in late November and early December 1988. The draft EIS will be presented to the board about January 1, 1989. Public meetings will be conducted in February. After the close of the comment period, the Governor's Office and the Technical Committee will prepare responses to comments and present any new information for inclusion in the final EIS. The final EIS will be issued in June 1989.

The 1987 legislature appropriated $183,800 for this project.

19. Natural Resources and Conservation, Department of, Sodium and Salinity Sources in the PowderRiver Basin -- A Chemical-Budget, Modeling Approach

This project started in July 1988. The objectives are to (1) expand the Powder River water quality data base by compiling existing data and collecting new data, (2) analyze variability and trends in water quality, (3) develop a water quality model capable of simulating monthly streamflow and dissolved solids loading, and (4) evaluate the effects of various management scenarios on surface water quality of the Powder River. The 1987 legislature appropriated $89,257 for this project.

20. State Lands, Department of, Drill Hole Reclamation in Montana; Hole-Plugging Trials Utilizing Bentonite

The contract for this project is currently being drafted. The 1987 legislature appropriated $100,000 for this project.

21. Natural Resources and Conservation, Department of, Conservation Districts Division, Montana's Accelerated Soil Survey Program

This project has not commenced, but a contract is currently being drafted. The 1987 legislature appropriated $300,000 for this project.

22. Governor's Office, Headwaters RC&D Area, and Deer Lodge County Conservation Disrict, Clark Fork Reclamation Demonstration for Floodplain Systems Impacted by Mining

This project has not commenced yet. RDGP funds should

become available the second quarter of 1989. The 1987 legislature appropriated $130,000 for this project.

23. Montana Bureau of Mines and Geology, Groundwater Information Center--Deep Aquifer Databases

This project has not commenced yet. RDGP funds should become available the second quarter of 1989. The 1987 legislature appropriated $155,950 for this project.

24. University of Montana, Botany Department, Improving the Biotic Resources of the Upper Clark Fork River

This project has not commenced yet. RDGP funds should become available the second quarter of 1989. The 1987 legislature appropriated $26,638 for this project.

25. Butte-Silver Bow, Government of, Urban Enhancement/ Mitigation of Past Mining and Smelting Damage through Urban Forestry

This project has not commenced yet. RDGP funds should become available the second quarter of 1989. The 1987 legislature appropriated $100,000 for this project.

26. Montana Bureau of Mines and Geology, Low Grade Bentonite for Shot Hole Plugging

This project has not commenced yet. RDGP funds should become available the second quarter of 1989. The 1987 legislature appropriated $45,890 for this project.

27. Health and Environmental Sciences, Department of, Hazardous Waste Minimization Project

House Bill 6, in 1987, provided $212,000 for a two-year Department of Health and Environmental Sciences project that involved three key functions: (1) evaluation of opportunities for and provision of workshops in hazardous waste minimization,(2) evaluation of the need for commercial hazardous wastes services versus the availability and costs of those services in Montana, and (3) establishment of a hazardous waste inspector position in Billings to enhance DHES's regulatory presence in the eastern part of the state.

Functions (1) and (2) were addressed via a contract. That contract has been completed, and a project summary has been submitted to the Environmental Quality Council.

An environmental specialist position has been staffed in the DHES Billings Office since August 1987. This staff inspector has conducted over 75 hazardous waste generator and transporter inspections to date. The position has also enhanced the waste minimization efforts of the hazardous waste program via a technical assistance component of routine inspections as well as technical assistance to persons inquiring by phone and letter. The DHES has submitted a modified budget request that would maintain the Billings staff position in the 1990-91 biennium. Funding will be 75 percent federal grant funds with a 25 percent state matching requirement.